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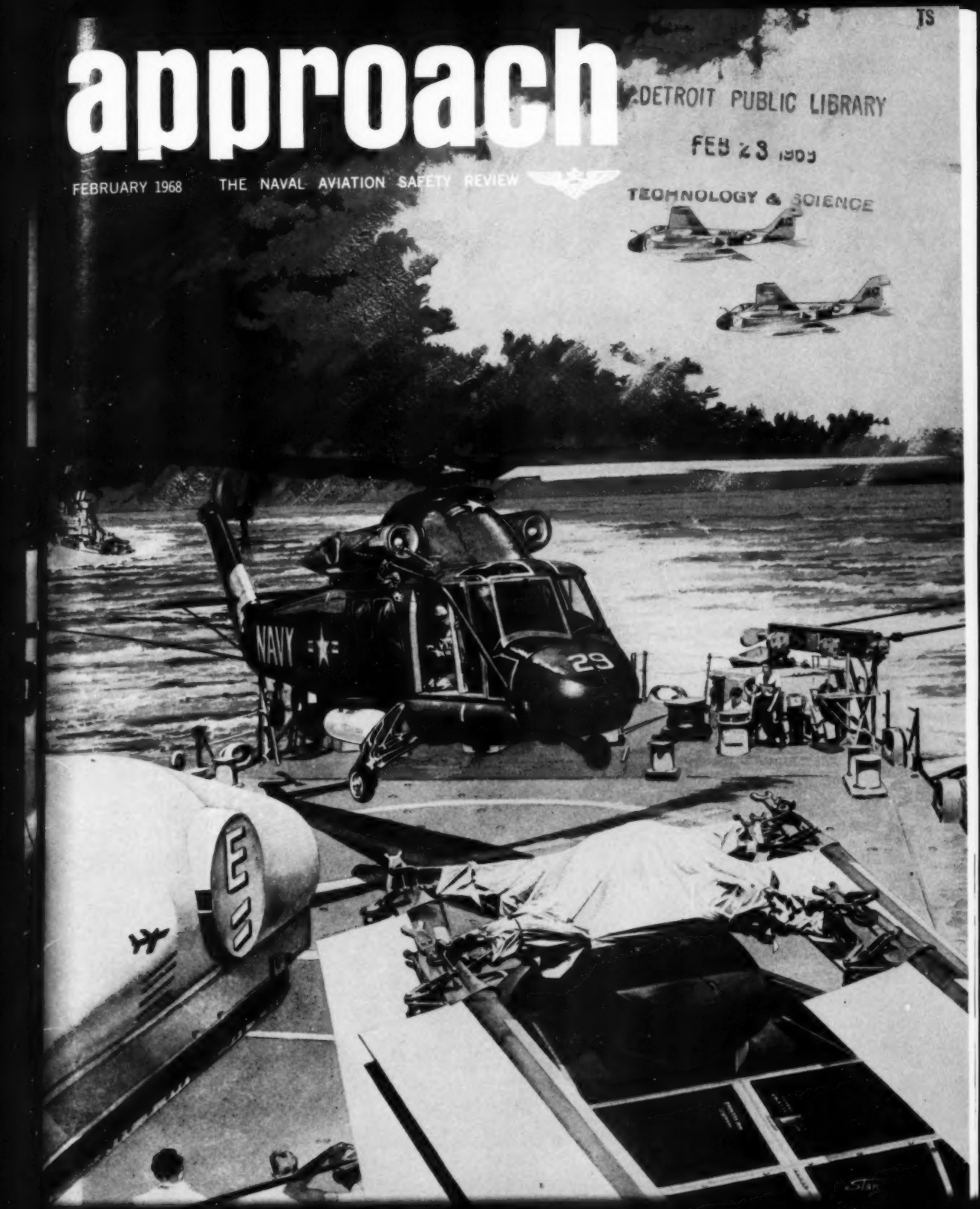
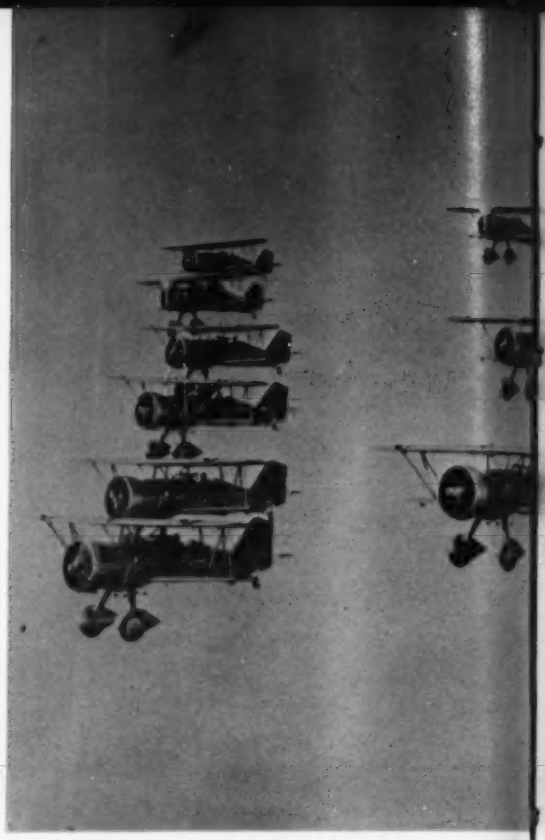
FEBRUARY 1968 THE NAVAL AVIATION SAFETY REVIEW



A Saga of Retractable Landing Gear



Wheels down, locked and welded.

An early wheel stowage idea.

Buttoned up F3-F wheels.

By COL J. H. Reinburg USMCR (Ret.)

When aircraft equipped with retractable landing gear became operational in the late 1930s, a transition was in order; naval aviators had to realign their thinking to remember a new and distinct requirement—*lower the wheels.* Because, up to that time, all pilots were basically stick-and-throttle jockeys; and the wheels were down, locked—and welded.

The idea of retracting the gear (undercarriage in the RAF) was to reduce drag thereby increasing speeds. Unfortunately, the trade-off penalty was more weight from additional mechanisms. From the beginning, aircraft designers attempted to fit their models with dependable, aerodynamically clean wheel retraction systems, while minimizing the additional associated weight. In the early days, the job was not easy because existing airframes did not lend themselves to being so modified, and it became readily apparent that new overall designs were required.

Simultaneously, it became evident that some wheel retraction designs were more prone to malfunction than others. Consequently, thought was given to systems which could extend by gravity and/or aerodynamic action when unlocked from the up position. Another factor which had to be considered was that some designs compounded the designer's problems because they altered the plane's center of gravity when extended or retracted.

Bending knees on the PBY.

The Bending Knee Type

The Grumman FF-1 was the Navy's first operational aircraft with a retractable landing gear. It was essentially a knee bend type for the main mounts while the tailwheel was not retracted. It was considered that the tailwheel was small enough to not warrant the added weight and complication of a retraction system. Follow-on models which had similar systems were the F2F, F3F, F4F, J2F, and SBC-4. Even the big old PBY became amphibious with a knee-bending gear and the R4D (C-47) had its brand of knee-bender. Much to the consternation of the pilots, the fighter bending-knee models utilized one arm-manpower for actuation and therefore all of them invoked pilot dissatisfaction to varying degrees. For instance, the F4F required 19 turns with the right hand. Sometimes a frustrating and somewhat amusing situation occurred. Soon after lift-off, to retract the gear, the pilot had to take his left hand off the throttle and put it on the stick so his right hand could work the wheels crank on the right side of the cockpit. A pilot, small in stature, usually had to lean so far forward to reach the lock latch and then the crank that he could not see through the windshield over the aircraft's nose. This type of blind flying was not conducive to a safe transition from takeoff to climbout. About this time, if the throttle friction nut was not tight, the throttle often vibrated backwards thereby reducing power at the very inopportune takeoff time. When this disturb-

ance happened, the pilot was usually in the process of cranking up the wheels. This instantly made him busier than the proverbial one-armed paper hanger. A few times, *Wildcats* have been known to settle back on the runway while the pilot was engrossed in cranking up the wheels. When this power loss occurred a few nimble pilots could force the throttle forward with their left elbow while keeping the left hand still on the stick. Most pilots, however, had to stop cranking, switch hands to restore the power. Then the unhandled wheels would re-extend. On a few occasions, the wheels fell back with such force that the retraction chain was broken which led to a bailout or a crash landing. In either case an aircraft was lost or damaged.

The Aft Retraction System First to Use Hydraulics

An early plane to use a hydraulic retraction system was the TBD, a single-engine, three-place tandem torpedo bomber. This airplane used a simple aft moving strut retraction allowing half of the wheel to remain exposed, thereby making it not very streamlined. Aerodynamic forces precluded free-fall gravity extension in case of hydraulic failure. Pilots were happy to note, however, that in case of a malfunction or if they should forget to extend the gear, the exposed half of the wheels spared the underside of the plane from much damage. The tailwheel of the TBD was not designed to retract on the then existing principle that the savings in drag would not offset the added complication and weight of the mechanism. Although the two positions of the main landing gear (MLG) altered the center of gravity it was, nevertheless, always within allowable limits.

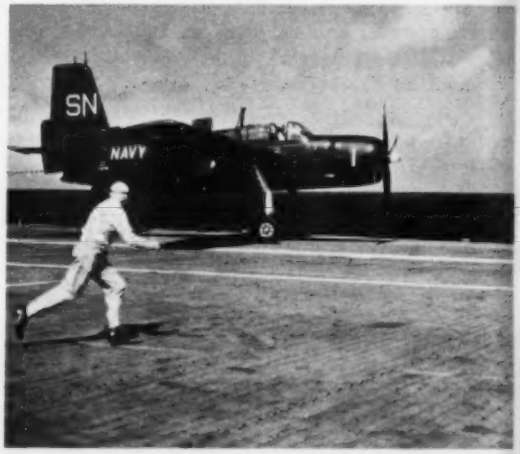
A Refinement to Aft Retraction

To get the MLG wheels flush into the wings, subsequent aircraft to the TBD had an added mechanism which rotated the wheel 90 degrees as the MLG swung aft. This allowed the wheel to fit flat into the wing for a fraction more streamlining and speed. Again, this system did not lend itself for emergency free-fall because aerodynamic forces were against it. Mechanical failures, however, were never too severe a problem and a secondary pneumatic blowdown system was quite adequate for emergency extensions. Some aircraft with this aft-twist system were; the F4U, F6F and A-1. The present day A-4 uses this MLG wheel-twist arrangement but the struts go the other way, forward—all three mounts.

The Advent of Tailwheel Retractions

The F4U was one of the first aircraft with a retracting tailwheel and it was later imitated by the F6F and F8F. By spring loading the tailwheel, it extended automatically when the hydraulic system failed.

Half wheels protruded from the TBD.



'Daddy-long-legs' gear on the AF-2S.

Common twin engine stowage system.

SNJs drew 'em UP sideways.

Enter Nosewheels

With the introduction of jet powered aircraft into the fleet, tailwheels gave way to nosewheels thereby providing vastly improved ground (deck) handling characteristics. This slightly increased the designer's work because the nosewheel and strut to be stowed were almost as large as the main mounts. By and large there has been little variation in this because either fore or aft allows for more adequate stowage space.

A Fail-Safe System

The C-54 (old R5D) had an excellent design wherein the main and nose mounts retracted forward. This allowed for almost non-existent extension malfunctions because it could free-fall and then be automatically locked into place by aerodynamic force, if it could be unlocked initially. Unfortunately, this very desirable type of retraction complicated the overall design of most subsequent aircraft so that more important features have overruled its extensive use. The present day A-4, however, has an almost identical system with all three mounts retracting forward. Also, the A-6 utilizes this forward retraction principle on its main mounts, but the nose wheel goes the other way: aft. Such alternating strut movements tend to keep the c.g. in balance at all times.

Sideways Retraction Systems

Some side retracting gear aircraft were the SNJ, F8F, and the very recent *Phantom II* (main mounts only; the nose wheel goes aft). This is a good MLG system because there is no c.g. shift and the flat of the wheel fits neatly into the wing eliminating an additional wheel twisting device. Moreover, the gear will free-fall (main mounts only) out in case of trouble if the unlocking mechanism can be actuated. Once the gear has been allowed to free-fall, the pilot can then skid the plane and thereby use aerodynamic forces to push the gear into the down-lock detent.

High Speeds Influence Gear Designs

Modern jets have forced many deviations from the fail-safe types of retraction systems (such as those that free-fall and have aerodynamic help) because such installations are often not compatible with other design requirements. One total exception is the A-4, mentioned earlier. Two partial exceptions are the A-6 and the F-4 which have such free-fall possibilities on their main mounts. The nose wheels, however, retract aft.

The F-8 and the A-3 use similar main mount arrangements which look somewhat imitative of the original knee-bend FF-1 system. Actually, there is no bending knee and the wheels just swing into the fuselage at an odd angle. The F-8 goes forward

Tuck-in time for the *Phantom II*.

while the A-3 struts swing the wheels the other way.

Present day efforts are concentrated more on reliable gear retraction mechanisms backed up by equally reliable emergency systems.

So much for the various systems and the pros and cons of their actuations as to reliability and simplicity. Retractable landing gear inserts another moving mechanism to the pilot's list of things to sequentially manipulate thereby adding a potential source of trouble. Accordingly, whenever a wheels up landing occurs, it is usually attributed to pilot factor until investigation sometimes proves otherwise. It is almost a reverse of the legal axiom that every man is innocent until proved guilty.

A Little Related Humor From the Past

Out of World War II (when retractable gears were fairly new and all the current pilots soloed in fixed gear jobs before they went on to operational models with retractable gears) several wheels-up jokes have evolved. One concerned a top ace who had just returned from an extended dog fight in an F4F. Owing to the excitement of the air battle he forgot to extend his wheels. As the *Wildcat* was skidding to a stop on its belly, the pilot heard the tower call, ". . . do you need assistance?" The embarrassed pilot quickly answered, "Hell no, I land this way all the time."

Another wag suggested that if his F4U wheels hung UP, he intended to jam his feet through the bottom of the crate and hold it up while running along.

Have Things Changed Today?

The expense and trouble to the Navy was and still is no small matter not to mention pilot embarrassment. Some of the more common causes are herewith narrated for armchair reviewers.

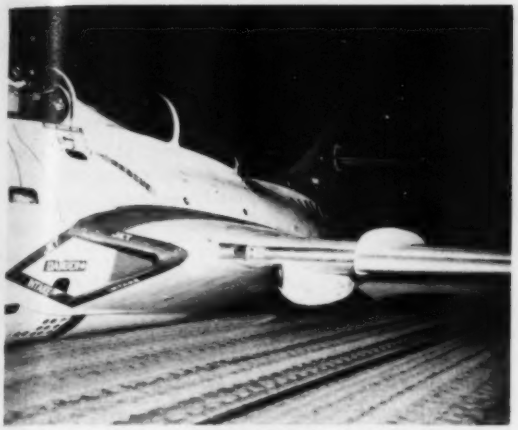
The Classic Cause of Wheels Up Landings

A student was being given some VFR night formation instruction in a TF-9J. Upon completion of the airwork, FCLP was next in the syllabus. The first pass was waved-off by the tower because of a fouled deck. In good habit, the pilot followed the NATOPS instructions for waveoffs and cleaned up the *Cougar*, which included retracting the wheels. The next time around, via a shortened circuit, the pilot had it fresh on his mind that he had just lowered the wheels so all was surely in order. The approach was good until the wheels-watch hit the aircraft with his aldis lamp and immediately noted that the gear was UP. Reacting quickly, the wheels-watch fired a flare but the *Cougar* had gone by and was nearing touchdown. The Runway Mobile Control Duty Officer also fired his flare gun but the aircraft was then just touching the runway. The pilot said he observed the flares only at touchdown.

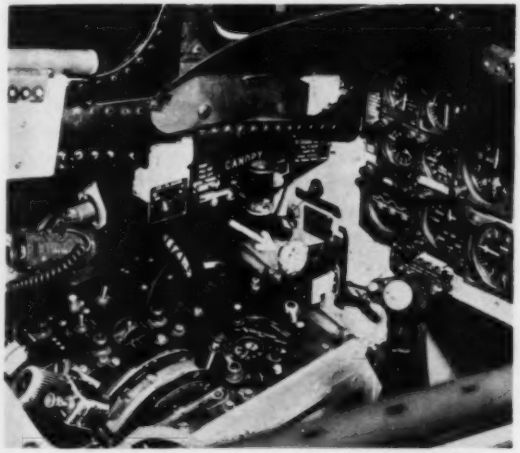
Here is the habit pattern interruption theory which has been flogged to death as the basic cause of wheels-up landings. This phenomenon has been given maximum publicity through the years as a major culprit but the message always seems to miss a few people. In short, anytime something has disrupted the habit pattern for any flight sequence involving checkoff list, recheck!

A Dual Situation Slip-Up

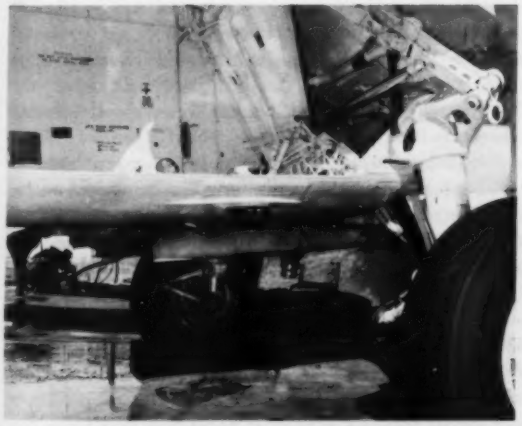
Two pilots were engrossed in VFR night touch-and-go landings in an S-2D. The senior pilot demonstrated two landings from the right seat. Then the



What wheels?



Quick investigation caught the F-9's gear handle UP.



A-3 MLG swings aft and into the fuselage.

left seat man made nine landings in various flap settings from a generally tighter-than-normal pattern. The tenth landing was planned with flaps remaining up and the landing checkoff list was not religiously followed. Somehow, the wheels were forgotten, perhaps because some unconscious thought tied itself in with the flaps UP intentional selection. Needless to say a wheels-up surprise shook reality into both pilots. There were no injuries other than to pride and Uncle Sam's aircraft inventory.

In reconstruction, it appears that the routine series of landings lured both pilots into complacency and relaxed. . . , maybe weary, forgetfulness. The copilot in the right seat radioed to the tower, by habit established in the series of landings, that the wheels were down and locked without double checking that the pilot had pushed the lever down. The pilot heard the transmission and was mentally but not physically with it. Unfortunately, the hum-drum of the all-too-routine bounce flight nullified an actual hand movement in compliance with the mental signal.

Half the Job Is Not Enough

An inexperienced A-3B crew checked over the assigned aircraft before being catapulted from the carrier. Preflight revealed a suspicion that the elevator boost mechanism was disconnected. Further inspection by the deck crew, however, could not substantiate this possible discrepancy so the *Skywarrior* was launched for some inflight refueling work.

The tanker mission was completed and while preparing to trap back aboard, the pilot concluded that, as originally suspected, he did have some elevator movement restrictions. After a series of radio conferences with personnel on the ship, it was considered prudent to bingo to the beach.

Upon establishing radio contact with the NAS destination, visibility was down to 2 miles due to low coastal stratus clouds (fog). Consequently, GCA took over. The approach was routine and the pilot acknowledged all instructions including the wheels-down requirement by actually moving the gear handle DOWN. Unfortunately, the crew did not subsequently follow-up this movement with a visual wheels indicator check on the instrument panel or actually observe the extended struts. The gear handle had not been moved far enough to actuate the system and *the wheels did not go down.*

Although the landing was radar controlled, the pilot was able to keep the runway in sight at all times. This condition is conducive to a "cheating" type of instrument approach wherein the pilot tends to keep his eye on the meatball and ignore the instruments. It would appear that this was one of

those instances that had the pilot *really looked* at the panel, he might have seen the light in the end of the handle and/or the wheels UP indication. In all fairness, the pilot did not forget the wheels. He did, however, forget to *ensure* the actual operation of the extension process and obviously did not get any help from the pilot in the right seat.

The wheels-watch was slow in actuating the waveoff lights, but nevertheless, he did flick them at about the time the pilot was commencing the flare.

The pilot stated, "I saw the red lights flashing just prior to the aircraft touching the runway—too late to do anything. Obviously, I was surprised to be skidding down the runway wheels up." To have seen the lights, the pilot could not have gone past the mirror. According to the report, the aircraft made contact with the concrete 290′ beyond the position of the waveoff lights. Although not a great distance (290′ plus some 50′ short of the lights) to an A-3B indicating about 125 kts, calculations show that the pilot had at least 4 seconds to attempt a waveoff. It is a matter of conjecture if a waveoff could have been accomplished in such a short time.

Slow on the Waveoff

A *Crusader* pilot was practicing GCAs at night in VFR weather. It was near the end of the scheduled airborne time so a full stop was planned. The pilot reported completing the landing checkoff list as requested. Nearing final, the F-8 was high and fast. The pilot overcorrected to get back on the slope, which resulted in being too low one mile from touchdown. Consequently, the controller advised him to wave off. For unexplained reasons, the pilot did not appear to respond and the aircraft continued to go low, finally disappearing off the precision gear. A few seconds later the F-8 contacted the ground, wheels up, 1650′ short of the runway threshold and slightly to the left of centerline. The pilot was injured and later unable to relate the exact sequence of events. He did insist that he had definitely lowered the wheels and the fact that the wing was UP would seem to substantiate this. Nevertheless the wheels were UP when the aircraft skidded to a stop and the handle in the cockpit was also UP.

Fatigue and confusion, perhaps, caused him to be slow in executing waveoff procedures as he settled onto the ground before the addition of power could take effect. Perhaps, an instant before or after he had advanced the throttle, he had flipped up the wheels lever as would be normal in waveoff procedures. It is a matter of speculation as to what might have happened if he had left the wheels down. Regardless, another wheels-up landing accident has been added to the files.

New Troubles Related to Old Ones

Apropos of takeoff problems with the old *Wildcat* of World War II, several *Crusader* pilots have had similar incidents. One was following his section leader on a routine formation takeoff. All seemed to be going well until about liftoff time. Then a bump in the runway caused both aircraft to become airborne a few knots slower than the recommended NATOPS rotation speed. The leader being some 50′ ahead of the wingman had that minute additional bit of airspeed necessary to remain airborne. The overly quick wingman, however, thought something extra was required of him to stay out of trouble so he instantly flipped the gear lever UP. Unfortunately, a few knots were still lacking and the tailpipe struck the runway pavement but the aircraft was, nevertheless, able to stay airborne on the AB bootstraps. A precautionary landing was made after an airborne inspection by the leader. There was repairable tailpipe damage.

Another *Crusader* wingman, in a separate occurrence, was not so fortunate in a similar formation takeoff wherein in-and-out of AB modulations set the stage for trouble. Despite the abnormal power manipulations, the number 2 F-8C did manage to get airborne with the final aid of full AB. An instant later the pilot was quick to snap the wheels UP and the wing down. Unfortunately, the cruise droops were retracted and this reduced the lift to such an extent that the aircraft settled back on the runway—wheels up. Upon skidding to a stop, the aircraft caught fire but the alert crash crew got the pilot out unscathed. Here is another of the infinitely different sequences of circumstances which fill the wheels-up files.

Through the years one of the basic requirements for the checkoff list has been the WHEELS DOWN part. Regardless, a few aviators seem to get confused when habit patterns are interrupted causing them to forget or overlook the wheels. Statistics at the NavAvnSafeCen show that there were 49 pilot factor wheels-up accidents/incidents from 1 January 1965 to 31 December 1967. This has been extrapolated to be about 17 per year. In that crew injuries seldom result, perhaps pilots are not sufficiently shocked by the penalty of forgetfulness. As patriots and tax payers, pilots must remain acutely aware of the dollar loss resulting from the sometimes struck aircraft.

The entire landing checkoff list must be followed religiously before each and every landing whether it is final or a touch-and-go. Be especially alert when something or someone interrupts the normal sequence of landing events. NATOPS is worthless unless adhered to.

The New PPC

By LTJG R. M. White, VP-49

Preparing for a round robin-flight in a P-3A, the brand new PPC filed his flight plan, took a check of the manifest, found all personnel aboard and everything ready to go. It was near Christmas and everyone wanted to get back to home and hearth as soon as possible. The flight was for airways training and scheduled drops of personnel going on leave.

The weather was forecast to be IFR upon their return, but still above minimums for almost all of the approaches available. The takeoff was uneventful with maximum fuel load aboard and the NTS check was satisfactory on all engines after getting airborne.

Upon entering the clouds at 2500′, moderate icing was encountered so engine anti-ice was selected. Rate of climb had to be slowed resulting in higher fuel consumption. Passing 16,000′ where the tops were supposed to be, it was still IFR and the climb was continued to FL 220, still in the clouds and icing. After leveling at assigned altitude, it was evident that VFR conditions were not the order of the day. The flight continued westward and since headwinds were increasing steadily, the pilots felt that clearing weather would prevail in a short time.

The P-3 broke out after 2½ hours of icing, and a quick check revealed that climbout and icing had required them to burn much more fuel than had been anticipated. Headwinds 30 kts above predicted strengths caused the new PPC to double-check with the flight engineer to see if the fuel packet was drawn as had been briefed the previous evening.

Horrors of horrors! The flight engineer had forgotten it.

Now faced with a possible fuel shortage, the PPC decided to cage No. 1 and continue on 3-engine max range. The sneers he would face from the criticizers upon their return for forgetting the fuel packet was not a small item in his mind. After all, he had just made it to the top and to allow something as stupid as forgetting his fuel packet to happen could only cast doubt on his abilities.

After the first passenger drop, No. 1 was caged once again at altitude. The fuel gage showed enough to get home with about 3000 lbs reserve. A quick check with FSS on homeplate weather revealed that it had gone from bad to terrible.

Now what? Land, call home for the necessary information and take the sneers, or chance getting in on GCA with nobody the wiser? Alternates with weather better than destination were all over 1½ hours of flight time away. If the weather deteriorated further, there simply was no place to go on 3000 lbs of fuel. He thought, "If it weren't for those &#$% ¢&* people always ready to make their little pointed remarks, it would certainly be a lot easier. Doesn't a guy feel bad enough as it is?"

Reason prevailed. He landed, called home base, got the necessary information, advised them of his forgotten fuel packet and passed his revised ETA.

Sneers?

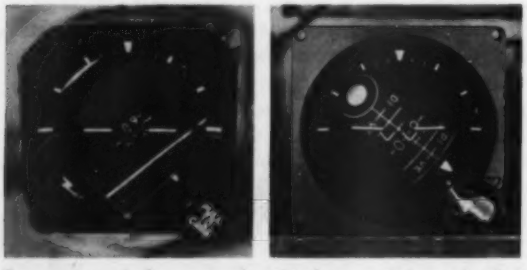
You guessed it. And a lot of pointed remarks aimed right his way. Wonder what will happen next time?

Cross Country

Along with the responsibility of returning the airplane in the same condition as when he signed for it, the military aviator has other obligations. One of these occurs when he is flying formation. If he is the lead he must use extra care so that he does not try an unorthodox or a nonbriefed maneuver which could cause a collision within the formation; with other planes sharing the airspace; or with the surface below.

He must always plan sufficiently ahead to successfully lead the formation clear of the worst weather.

An IFR mission demands that care must be taken to ascertain that all pilots in the formation are competent for flights of this nature. If on a VFR flight the leader must make his decision to alter course in sufficient time to ensure the flight can safely follow him as briefed. A wingman shares similar responsibilities to his lead and the rest of the formation.



Two recovered from unusal attitudes on instruments, but two didn't . . .

The pilots in a recent cross-country formation flight invoked some extreme penalties for not having the greatest of regard for flying discipline, and thunderstorm peculiarities.

Four A-4 aircraft took off from NAS Hotrock on a VFR flight plan, FL 225, 2 hrs and 40 mins enroute.

The takeoff was delayed for about one hour due to a thunderstorm passing directly over the field. After finally getting airborne, the flight proceeded northwest at about 2500 to 3000′ under an overcast.

The flight made a few passes in division formation over the home of lead's (No. 1) parents on the outskirts of Base City. The lead was then changed to the second section leader (No. 3) and the flight proceeded westward. To avoid some visible weather, the flight turned to a heading of 300 degrees, climbing to FL 225. Thunderstorms, towering cumulus and haze were in the area. The flight flew between cloud layers into a very hazy condition which obscured any visible horizon.

The new lead (No. 3) experienced disorientation while attempting to turn toward a clear area to circumnavigate the thunderstorms. Thinking he was in a right bank when his left wing was actually down, he attempted a left turn. This increased his left wing bank angle so that he became inverted. Simultaneously, the formation inadvertently went pop-eye. The lead, realizing he was in an unusual attitude, lowered his seat to better effect recovery and mistakenly turned off his pitot heat switch. This act caused immediate icing of the pitot tube. Upon seeing his airspeed indicator begin to unwind, he quickly discovered his trouble, turned the pitot switch back on and restored his airspeed indicator to normal. Recovering from his unusual attitude at about 18,000′ he reduced power to idle, popped the speed brakes, leveled the wings, and raised the nose. As he was completing his

recovery he broke out of the clouds into a clear area.

The wingman of the leading section, (No. 4), and the second section (Nos. 1 & 2) followed No. 3. They lost sight of him when he entered a near vertical dive to the left. During this maneuver No. 4 was well behind and observed No. 1 making two violent rolls to the left of about 60-70 degrees. At this time No. 4 turned his attention to his cockpit instruments and found himself descending at a dive angle close to 90 degrees, . . . airspeed and altitude was unknown. He recovered by reducing power to idle, extending the brakes, and concentrating on the gyro horizon. When he resumed his scan he found himself at 7000′, at about 250 kts in level flight, in a rain storm.

And the wreckage was found the next day.

Number 3 called for the rest of the flight on the squadron tactical frequency but only No. 4 answered. They executed a rendezvous in the clear at FL 180 utilizing the UHF homing equipment. Attempts to contact the second section were unsuccessful. The circumstances were reported to the nearest FAA Center including the possibility of a midair collision between the two other aircraft. The section then diverted to nearby NAS Conus and landed without further incident.

No further contact was established with No. 1 or No. 2. SAR efforts were initiated immediately. Thirty aircraft and three helicopters were launched to search an area of about 75 miles by 28 miles. The search was continued until late at night with negative results. The next afternoon the wreckage of No. 1's airplane was found with the pilot's body therein. A short time later, the body of pilot No. 2 was found. He had ejected but with insufficient time for his parachute to fully open.

It is hard to believe that the lead pilot could have been so slow in his decision to alter the formation course in sufficient time to ensure that the flight would remain VFR. This, of course, was the first link which led to the rapid chain-reaction double crash.

Once the two surviving aircraft recovered from their unusual attitudes, they did not turn back but continued on the same general westward course encountering no more IFR hindrance. This decision could have led to more trouble as opposed to returning to the point of takeoff unless information was obtained that the worst of the weather had been traversed, and, therefore, a decision to continue was best. It is interesting to note that the two crash sites were located in a remote area approximately 300 miles from both NAS Hotrock and NAS Conus.

Like many such accidents/incidents, the mention of vertigo is present.

There are many times when weather is without a visual horizon. Of course the answer is that when vertigo distorts one's equilibrium, the pilot must force himself to believe those expensive flight attitude instruments.

The pilot is headed for disaster if he refuses to believe the basic flight attitude instruments which can be accurately cross-checked with each other.

SPECIAL

Exterior views of recovered cockpit module showing little or no appreciable damage from the ejection and descent.

BREAKTHROUGH!

First Emergency Escape Utilizing F-111 Cockpit Module

The first emergency escape from an aircraft utilizing a cockpit module occurred on 19 October 1967 when an F-111A went out of control and crashed near Fort Worth, Texas. Although loss of the aircraft is regrettable, the successful use of the module represents a distinct technical "first" and an advancement in aircraft escape systems.

The success of the ejection is a particular source of gratification to the Navy which initiated the development of the module concept in 1948. An escape system similar to the one used in this accident is installed in the F-111B, the Navy version of the aircraft.

An interview with the aircraft commander and the flight engineer shortly after the mishap revealed the following information.

When control of the aircraft was lost, the ejection was initiated by the flight engineer at the pilot's request. The aircraft at the time was at an altitude of approximately 27,000′, mach .85 (285 KEAS) and in a 20-degree nose-up, slight left-wing-down attitude.

The ejection was clean and smooth with a force that the aircraft commander considered less than he had experienced in a prior ejection from an F-8.

The first phase of the descent from 27,000′ to 15,000′, during which the module free-falls in a nose down attitude stabilized by a drogue parachute, was described by the pilots as ". . . an exciting attitude, but not uncomfortable." During this phase the aircraft commander gave a thumbs-up gesture to signal his satisfaction, whereupon the flight engineer grabbed his hand and shook it.

The main recovery chute opened smoothly at 15,000′ and repositioned the module in a horizontal attitude. The occupants described this sensation as being similar to a dip in a roller-coaster ride. The pilots at this point again shook hands then took out their emergency checklists which they studied during the remainder of the descent.

Some smoke which had leaked from the ballistic system and entered the cockpit was described by the flight engineer as being ". . . similar to the cigarette smoke in a small bar at 2 a.m." Both pilots opened their canopies for short periods of time with no difficulty in order to clear the smoke from the cockpit. Although they also removed their oxygen masks occasionally to talk, both pilots emphasized that they felt no bad effects from breathing the smoky atmosphere.

The module touched down in a pasture in a normal attitude but wind drift caused it to roll inverted. The pilots described the impact force as being about ⅓ of the ejection force and very much softer than they had expected. With the exception of some slight difficulty (which amounted to a one to two second delay) in releasing their restraint harnesses because of the inverted position of the module, both pilots exited the cockpit with no trouble. While proceeding to a nearby farm house, the aircraft commander sustained the only injury connected with the mishap when he pricked his finger crossing a barbed wire fence.

The ejection provided valuable information in the following areas:

(1) Ejection Force—Concern had been expressed that the rocket thrust could cause spinal injury to the pilots during ejection. It was proven that this was not the case.

(2) Impact Force—Concern had also been expressed that the occupants of the module would sustain back injuries due to ground impact forces. This was also disproven.

(3) Cockpit Atmosphere Contamination—It was demonstrated that the canopies could be opened during descent without difficulty. The contractor has also initiated corrective action to prevent gas leakage into the cockpit.

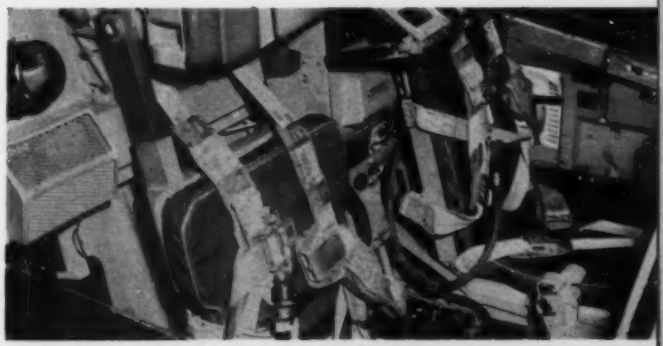
The interior view of the recovered cockpit module shows console and instrument panel intact and virtually undamaged.

(4) Recovery of Equipment—The module ejection and recovery preserved an estimated $100,000 to $200,000 worth of undamaged aircraft equipment in the cockpit.

(5) Assistance to the Accident Investigation—Recovery of all cockpit instrumentation and controls was of great value in providing flight data at the time of ejection.

(6) Environmental Protection—The capsule, due to its complete integrity following land impact, would have provided both a source of survival equipment and a large measure of environmental protection to its occupants had there been a threat of extended exposure.

The potential of the escape module for providing an optimized operational environment and superior survival and rescue capabilities cannot be overstressed. The concept has wide application to both fixed and rotary wing aircraft. It will surely influence the design of future aircraft and contribute to the overall effectiveness of aircrews.



Another interior view of the recovered cockpit module shows the undamaged condition of the crew seats.

In the following article, Dr. Gary J. Tucker, psychiatrist and former Lieutenant Commander in the Medical Corps, discusses the source of the anxiety which some pilots manifest in response to a disorienting experience. Dr. Tucker was assigned to the division of psychiatry and neurology, U. S. Naval Aerospace Medical Institute, Pensacola, at the time he wrote this article. He is at present a member of the faculty of the School of Medicine, Yale University.

VERTIGO and ANXIETY

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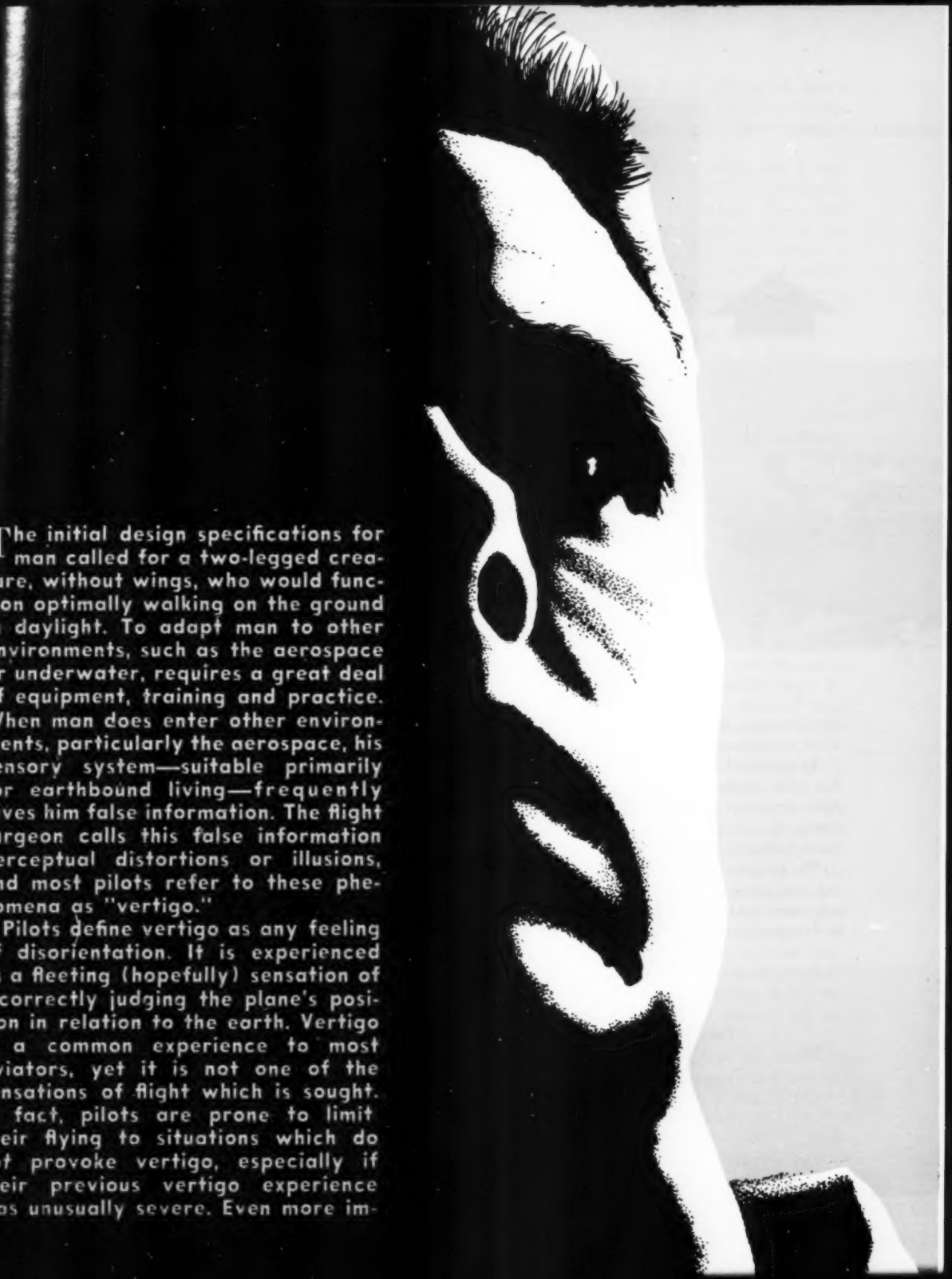


The initial design specifications for man called for a two-legged creature, without wings, who would function optimally walking on the ground in daylight. To adapt man to other environments, such as the aerospace or underwater, requires a great deal of equipment, training and practice. When man does enter other environments, particularly the aerospace, his sensory system—suitable primarily for earthbound living—frequently gives him false information. The flight surgeon calls this false information perceptual distortions or illusions, and most pilots refer to these phenomena as "vertigo."

Pilots define vertigo as any feeling of disorientation. It is experienced as a fleeting (hopefully) sensation of incorrectly judging the plane's position in relation to the earth. Vertigo is a common experience to most aviators, yet it is not one of the sensations of flight which is sought. In fact, pilots are prone to limit their flying to situations which do *not* provoke vertigo, especially if their previous vertigo experience was unusually severe. Even more im-

pressive than the avoidance is the emotional impact these experiences often have on aviators.

As one reads over accident reports where vertigo has been implicated, it is impressive how frequently this experience is accompanied by a complete breakdown of an experienced and well-trained pilot's habit patterns.

The purpose of this article is to provide a theoretical formulation for the source of the marked anxiety some pilots manifest during and in response to a disorientating experience. Although disorientation can occur at any time and under any conditions, it is most frequent at night, in IFR conditions, and in very high performance aircraft. We will briefly touch on the common types of disorientation.

Four Main Categories

There are four main categories of disorientation or vertigo:

(1) *Visual Illusions*

(a) Distortions of perspective and depth perception.

(b) Apparent motion of a usually solitary light source at night or in dim light—autokinesis.

(c) Sensations involving relative motion.

(2) *Non-Visual Illusions*

(a) Failure to perceive rotation, or to perceive rotation when there is none.

(b) On high speed turns, a sudden head movement will cause a sensation of pitching up or down, depending on whether the head is moved up or down.

(3) *Conflicting Sensory Cues*

(a) The feeling of banking to the right when the visual horizon indicates that we are actually flying level.

(4) *Dissociational Phenomena*

(a) Loss of time or directional sense.

(b) Fascination. The pilot fails to respond adequately to a clearly defined stimulus situation, in spite of the fact that all necessary cues are present and the proper response is well known to him.

Most pilots have experienced one or many of these phenomena (and others not noted). Most pilots know when they are confused about their plane's relation to the earth, and they go immediately to their instruments. Most pilots know that these phenomena relate to accelerative and gravitational forces of the vestibular apparatus of the middle ear, an apparatus which was primarily designed for terrestrial life.* Yet some pilots still panic at these experiences. The data from psychiatry clearly indicate there is anxiety over disorientation. This sudden disorientation leads to a feeling that the pilot has lost control of the plane, the significance of which can best be understood by analyzing the process of learning to fly.

Strange Perceptual Environment

The new flight student suddenly finds himself in a strange perceptual environment. Initially, everything is alien to the student aviator; the plane seems to have a will of its own, the clouds are enormous, and nothing on the ground looks familiar. On the first few flights in the cockpit, the student is rigid; he seems to feel that if he moves or jostles the instruments the aircraft will come tumbling from the sky. His grip on the controls is like a "death grip." He seems to be trying to hold the plane in the air by this one control.

To the student, the plane is an alien beast that controls him rather than his controlling it. He is responding to the movements of the plane and has little sense of control of the plane's motions; therefore, the student has little idea of where he is or where the plane is taking him, as well as only a

*For those who wish to go into more physiological detail, there is an excellent publication by Clark and Graybiel: "Disorientation: A Cause of Pilot Error," U. S. Navy Bureau of Medicine, Research Report No. NM 001 110 100.39; and a fine illustrative movie of this subject—"Vision in Aviation Medicine: Illusions," Navy MN 9480b unclassified.

partial approximation of where the plane is in relation to the earth. Consequently, he is initially in a state of continual disorientation.

Pilot Fuses With Plane

As the student's training progresses, he begins to feel that the plane is acting as he commands; the plane is doing what he wills it to do. As the student finds the plane acting more responsive to his commands, much as his arms and legs do when on the ground, he not only feels more comfortable, but has also incorporated the physical aspects of the plane into his own body image. We might say that he is now *fused* with the plane on a perceptual-motor level. He no longer thinks of where the wings are or where the landing gear is, but he knows—just as he knows on the ground—where his arms and legs are in relation to objects around him. When the student finds that he can maneuver the plane at his will, and thereby himself, through the three-dimensional environment, he no longer feels anxiety over his ability to move in the airborne environment. But, to do this, the student must feel that he is fused with the plane; i.e., that the plane is acting as a part of himself, a part of his own body.

Must Master New Tasks

As the student advances to each new phase—instrument flying, formation and carrier landings—a new perceptual task is encountered which he must master in the same manner of perceptual motor control and fusion. If a pilot is not comfortable in one of the phases of flying and has been unable to experience fusion with the plane, perhaps in instrument flying, it is not uncommon to notice an attempt to avoid this type of flying in his future aviation career.

The anxiety of learning a new motor task is soon forgotten, once mastered, whether it be swimming, riding a bicycle, or flying an airplane. The almost continual state of disorientation experienced by the fledgling pilot, until he can control the aircraft, is soon forgotten. However, when he becomes subject to the perceptual illusions associated with flying, such as false sensations of rotation, or seeing the plane bank left, but feeling it bank right, the plane then *again becomes something alien.* It becomes a thing moving him, rather than his moving it. The fusion with the plane is broken; the pilot's sense of control of the environment is lost, and anxiety results. *It is this sudden anxiety, the sudden feeling that the plane is alien, that can lead to panic and possible disaster.*

Lessons to Be Learned

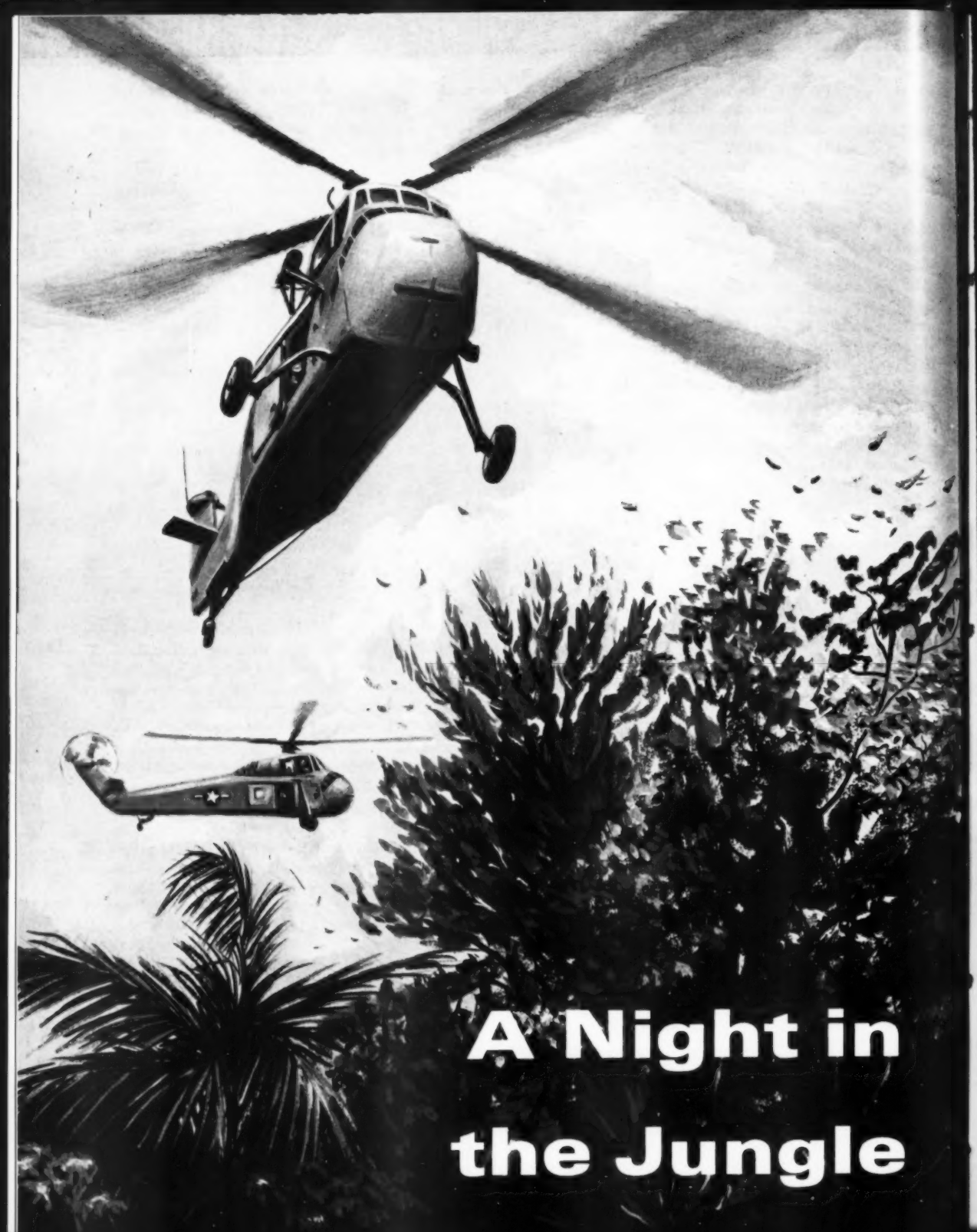
What can be learned from all this?

(1) Perhaps most significant is the fact that, if an aspect of flying is uncomfortable, or you have trouble getting the "feel" of it, do not avoid it. If instruments are difficult, they must be practiced until they are easily controlled.

(2) You as an aviator should attempt to experience some of these phenomena in a controlled situation such as a Barany chair (a rotating chair for ear evaluations) but, above all, be aware of these phenomena and what motions of the pilot or the plane can produce them.

(3) Discuss atypical sensations experienced in flight with your flight surgeon and other pilots.

(4) As most of these phenomena occur at night and in IFR conditions, aspire to becoming the best instrument pilot in the world; make sure the disorientation is always in the plane's relation to the earth and not in your relation to the instruments. The former can be corrected, the latter situation leaves little time for practice or speculation.


A Night in
the Jungle

Evading would-be captors, hiding in the jungle throughout the night and trying to attract the attention of rescuers and, at the same time, elude the enemy the next morning . . . 17-1/2 hours which ended in helicopter pick up at noon.

Fire following the explosion of one of the A-6's bombs under its starboard wing on a mission necessitated the ejection. In the story which follows we will call the pilot "Bill" and the bombardier navigator, "Joe." Joe ejected first so we will begin with his experiences.

"Halfway through my wingman's Mayday call, I positioned myself and ejected," the bombardier-navigator recalls. "I cleared the aircraft and the entire automatic sequence happened long before I could do anything myself. Shortly thereafter I noticed that I was still holding on to the ejection D-ring face curtain."

When he let go of the D-ring and tried to hook up the Harley buckle fitting on his torso harness to connect it to the survival pack, Joe found that both of his hands were severely bruised. This, he thought, must have been from ejecting through the canopy. Giving up his attempt to fasten the Harley buckle, he turned his parachute and saw the pilot below. Both men were headed toward a ridge line. He watched as the pilot touched down in a marshy area.

Thinking he was going to land in deep trees, Joe crossed his arms in front of his face. At that instant he hit the ground smartly in savannah type growth and brush, hurting his back in the process. His pistol, though strapped under his survival pack and lashed to his Mk-3C, broke loose striking him first in the stomach, then under the chin.

"I opened my rocket jet fittings with great difficulty, because my hands were hurting so badly," he recalls. "I then removed my hard hat because I couldn't hear as well as I wanted to and also because it was white and highly visible with orange and white luminous tape on it.

"I opened my raft, disconnected my seat pack, removed the PRC-49 and immediately vacated the area. At first I proceeded towards Bill's chute which I could see because we were only about 300 yards apart and I was on higher terrain. Then I thought, 'This is a bad idea.' (Bill and I had agreed previously not to join up unless it was going to be a long haul.) I doubled back on my tracks and headed east, travelling hard for about 15 or 20 minutes. All this time I heard numerous people yelling loudly back and forth as if they were trying to make us panic and expose ourselves.

"After about 20 minutes of running, I stopped and took off my anti-G suit. I took the little name tag off and put it in my pocket; then I hid the suit as best I could and buried my Martin-Baker garters under the leaves and mud.

"I could hear a stream and I proceeded down an embankment towards it. Checking for possible followers and seeing none, I walked into the stream and traveled upstream to break my trail and scent. I crossed to the other side and climbed up the steepest part of the embankment. I figured, 'The harder it is for me, the harder it is going to be for them also.'

"Completely exhausted, I got to the top of the hill and found a point that would hide me. I rested there for about 15 minutes before I started moving again, following game trails as much as possible so

I wouldn't leave any new trails. My terrain was a lot easier to travel than Bill's because it was 7′ to 8′ tall grass with moderately dense underbrush. I picked up another ravine and found another stream to travel. In this way, as I said before, my scent would be broken. I could travel faster and my noise would be covered.

"Dusk was coming on at this time. I was anticipating sunset somewhere around 1930 but there was still a good amount of light. I rested in the dense undergrowth by the side of the stream for another 15 or 20 minutes as close to the ground as possible with the reeds and weeds pushed up around me so they would look normal.

"My whole philosophy at the time I landed was to put as much distance between myself and my chute as quickly as possible and then work from there. I was also attempting to go for the highest ground. In this way I could survey everything, keep my sense of direction and also make it difficult for them to pursue me. After departing the stream area, I started up an embankment, deliberately doubled back twice trying to throw off my track, and headed for the top of another ridge line about two ridges from where I had landed.

"I reached the top of the second ridge just at moonrise. The moon was real bright and would show my position if I profiled myself on top of a hill so I avoided the crest. Again I found game trails; the ground was real firm and I didn't leave any footprints. I could see a light below me and occasionally I could hear voices."

After resting a short time, Joe proceeded down the game trail, followed it along a ridge line and then turned off onto a smaller trail.

"By this time I was about a mile from where I had landed. I traveled through some more reeds and brush and got to an area on the lee side of the hill. I decided that this would be a good pick-up spot because I could survey the general area. Now I could see that we had gone down in a bowl-shaped area with a ridge separating two smaller bowls.

"I stayed in this area from approximately midnight until 1100 the next day. I buried myself right down close to the ground, took off all of my survival gear and put it underneath me or covered it so that it wouldn't be seen easily, pushed up all the grass around me as best I could to cover myself, and tried to get some rest. At times during the night I could hear footsteps. I remember thinking 'It might be large game but game is usually quieter.' The next day I saw small shallow bootprints, about size five.

"Like Bill, I had absolute faith that when the sun came up the next day, I was going to see helicopters. I knew that the time we went down was bad for rescue because there was only an hour and a half to two hours until sunset. However, the sight of our orbiting wingman was reassuring. He orbited for about two hours but I had no real opportunity to make radio contact with him.

"The next day, at about 0600, I heard an aircraft but I couldn't see it. It sounded very distant and I thought I was just hearing things in my anxiety. However, at about 0615, I not only heard but saw a C-54 at about 11,000′ heading due north directly overhead. I immediately got out my PRC-49 and started talking but received no reply. My transmitter was intermittent and probably down 90 percent of the time but I didn't realize it then so I just kept talking. Shortly afterwards, at about 0630 or 0700, several A-1s arrived and commenced orbiting the area at various altitudes following the terrain.

"I could now hear voices quite heavily around the area. It sounded like they were actively searching for us again. Since my PRC-49 receiver was working, I could hear Bill talking to the A-1's on the radio. I heard the A-1s say that they thought they saw both of us and that they were going to send for choppers. Two of them left the area to escort the helicopters.

"At about 0815, two UH-34s arrived. I started talking to them; however, they probably weren't receiving me. They started searching Bill's area. They proceeded to a ridge very far north and I quickly realized that the clothing we were wearing was good camouflage and that it would be very difficult for them to spot us. *For this reason, I think the PRC-49 is the single most important item that we could have in the survival kit. You can give your position to your rescuer without revealing it to the enemy and you can be more explicit on rescue directions.* I feel that it is extremely dangerous to use anything else because of the possibility of compromising your position to the enemy.

"As one helicopter attempted to locate Bill, I talked with the other, giving him instructions for locating me. I believe that it was just coincidental that he was doing what I was asking on the radio. I asked him to proceed over to the eastern portion directly across from the area opposite the pilot. He came over to me and I moved a few feet out of my hiding place so that I would be more visible. The copter came around right behind me and passed directly overhead. I waved to the crewman and he waved back at me and they just kept going. Apparently he didn't tell the helo pilot that I was there. At this time, I really felt like I had had the course as the helo went back toward Bill. (*This was,*

perhaps, the same helo from which the crewman waved to the downed pilot but could not communicate to the gunner.—Ed.)

"To go back a minute, just before this, I heard a single shot right close to me. Apparently it was someone firing at an A-1. I heard Bill warn one copter that he was streaming fuel and had been hit. The stricken helicopter left escorted by the second helo and two A-1s.

"I felt extremely depressed at this point and I thought the best the helicopter could do in a turn-around was to get back to us in about another hour or two. Since there were troops all around us, I felt that every minute was precious because they were getting closer to us. However, it did occur to me that they didn't know where I was but they knew where Bill was because most of the shooting was coming from his area. In addition, the helicopters were concentrated in his vicinity so I figured they thought that both of us were on that ridge.

"Approximately two hours after the last chopper left, I thought that it was a good time to make my play for better terrain. While I had been waiting, I had thought about making the long walk to the higher terrain and how I was going to go about it. I surveyed all of my survival gear and my personal survival kit pack and took out the signal flares from my Mk-3C. It was my intention to use the daysmoke signal should the helicopters return. I had determined my radio to be down by a radio check.

"I got out of the area and proceeded again on the ridge line just below the top, breaking my way through the reeds and looking for some low cover that I could travel through unhindered. I wanted to get to an area that was relatively clear so that a helicopter could land with a hill to shield it from ground fire and so that I wouldn't be seen using the daysmoke signal. If a chopper should come, I would be in a good position for rescue and, if it didn't come, I could continue on the perimeter of the ridge line and circle my way around, eventually working my way west.

"I noticed as I was walking along a game trail that there were fairly fresh boot prints as close as 20′ from where I had hidden during the night.

"I walked as far as I could but tired quickly so I dropped down to rest and analyze the situation. At about 1145 I heard aircraft returning. I immediately ran to the top of the hill from my position 30′ below the crest and activated a daysmoke signal which I arced above my head. Apparently they didn't see the first one so I lit off a second and saw a T-28 break and dive for me. Thinking he was going to strafe me, I hit the deck and stayed pinned down. The T-28 climbed, made a tight turn and flew back over my position. I waved at him and he waved back in acknowledgment and I assumed that he was spotting me for the chopper. Shortly thereafter, the chopper came right in over me and touched down. I ran to it, jumped aboard and it quickly took off.

"We then proceeded over to the area where Bill was and circled for about 20 minutes. We were being shot at and an Air Force chopper located about 50 yards south of Bill was drawing fire from the troops. We orbited Bill's area three times before we spotted him and went in. The hoist kept tangling in trees but after numerous attempts, it looked as if we finally had succeeded in getting the sling to him. The cable came up and then the top of the horse collar with nothing on it. I was shaken by the apparent empty sling but then saw Bill's arm lashed through it and here he came with half the jungle tangled around him. We were like two kids with new toys as we shouted greetings to each other above the engine noise.

"In retrospect, I attribute my confidence in the jungle to survival school, hunting experience and the survival trek in the Philippines. I feel that it is good policy to think about what you have for cover and then to utilize it to the best of your ability and imagination. I avoided the area where Bill was because I thought it would make it difficult for a helicopter pick-up with two survivors in one place and because I felt that the enemy would be forced to divide its forces for the search.

"Bill and I are avid physical fitness advocates,

working out every night as a regular routine. I'm sure that this helped us out a great deal and that we had a lot of staying power that we might not have had otherwise."

* * *

The bombardier navigator's philosophy of remaining free in this instance was, as he stated above, to put as much distance as possible between himself and his chute as quickly as possible. The pilot's situation was somewhat different—searchers were in his vicinity within minutes after he landed. His strategy was to hole up until the middle of the night, then move to a better hiding place which would be suitable for a helo pickup. Now we turn the clock back to the cockpit emergency and follow the pilot until rescue . . .

* * *

"I slapped the bombardier-navigator's leg and said 'Eject!'" the pilot begins. "I watched him go out and a second or two later pulled my ejection handle and went. Everything happened faster than I could imagine.

"I looked up and Joe was about 1000′ above me although he had ejected first; he seemed to be hanging there in space. Prior to hitting the ground, I watched the aircraft fly into the side of a mountain and explode. A secondary explosion after it hit totally destroyed it.

"Upon reaching the ground, I had a good landing in a marshy area with big rushes about 10′ high. The parachute caught in a tree about 20′ above me, but I landed on the ground, released my rocket jet fittings and took my helmet off.

"While I was descending in my parachute, I had seen people pointing at me so I knew they would be out there immediately. I couldn't wait around and didn't know where Joe had gone. I had last seen him drifting toward a big grassy hill south of where I had landed. I couldn't go that way because it would take me more than 5 minutes to climb this hill and I knew people would be out there shortly. I looked to the northwest and there was a big hill of dense thick jungle undergrowth so I crossed a small stream and proceeded in that direction. I had already removed my survival equipment container with the PRC-49 radio from my seat pan and left the raft behind. I took the pack with me, crossed the little stream and entered a rice paddy. I went about 10′ into the rice paddy but the mud was so thick I couldn't run through it. I came back to the edge and ran around the dike area on the side and crossed a little foot path. There were no vehicle tracks on it but there were donkey, horse or oxen tracks.

"I proceeded up the hill and into the undergrowth. I found an area with nice thick overhanging brush and vines which I hid beneath. Within five minutes after I landed, I heard 10, 15 or even 20 voices. I couldn't tell just how many but there were definitely men out there searching the area and yelling and beating the brush and undergrowth trying to find me.

"We had ejected about 1830 local time. I knew sunset would be around 1930 but it seemed as if the sun was never going down. It didn't actually get dark until around 2000. All during this time, people were out hunting for us. I hid in the same location until almost 2200. During the time I was hiding, the voices sounded like the searchers had joined hands and were covering the creek area thoroughly. At 2200 the voices faded off. I waited another hour, then took off my torso harness and anti-G suit. After taking everything off the torso harness, I buried it and the anti-G suit under a leaf pile.

"At this time I no longer heard any voices but there was a strange mechanical sounding noise like crickets chirping in the little valley area in which I had landed. Joe said later he heard the same noises from his position on the other side of the grassy hill. The sound stopped after 30 minutes. *(This may have been some kind of irrigation apparatus.—Ed.)*

"About 2300 I left my hiding place and proceeded northwest up the hill, finally reaching the top at 0200 after stopping every 15 minutes or so for a rest. The vines and undergrowth were so thick that I had to crawl on my hands and knees in some places and on my stomach in others to get through. For protection I tried to get to the thickest, densest places I could find and that is where I got because I could barely make any progress.

"I got to the top of the hill around 0200, as I said, and found the trees were still too high for a helicopter type rescue the next morning. The trees were so tall that I decided to go 20 yards back down the hill and stay in some thick undergrowth. Around 0230 I found a real good hiding place and stayed there the remainder of the time. I put a mosquito net hood over my head and stretched out and tried to get some sleep. Mosquitoes don't usually bother me but they were quite bothersome that evening. I zipped up my flight suit and tried to doze off but never did actually sleep. I was too excited and just lay there with my eyes wide open.

"The next morning around 0500, just before sunrise, I heard an airplane. After daybreak around 0630 I could see a four-engined aircraft circling overhead. The previous evening, I had checked my PRC-49 out thoroughly, pulling the aerial up and making sure the battery was connected. When I saw the aircraft, I pulled the radio out and called them

but I didn't receive anything so I figured my receiver was bad (which it was). I called the pilot to rock his wings if he heard me. He slowly rocked his wings for acknowledgment. I told him I was not receiving.

"Along about 0715, four A-1s came over and I radioed to them and told them to rock their wings for acknowledgment if they heard me and they each rocked their wings. Around 0730 or so when the sun got up over the mountain, I was able to give them my location by using a signal mirror. I shined the signal mirror in their direction and told them I was using it. They rocked their wings, signifying they could see my position or my approximate location.

"At about 0815, two helicopters arrived in the area but they couldn't find me. The A-1s could see me and I am sure they were passing the word on to the helicopters but the helicopters couldn't locate me.

"One of the helicopters was searching the area right around me. At this time a man walked within 10 to 15′ of me. When I heard him approaching I was standing up transmitting to the helicopter. I immediately got down on my stomach and hid in the undergrowth. I am sure he walked right up near me, then proceeded back off through the jungle. The jungle was so thick he couldn't see me from 5′ away.

"The helo was proceeding toward me when the men on the ground started shooting. I heard ground fire below us and sat up and transmitted for the helo to get out of the area. At this time it got hit. This was about 0830.

"Two of our A-6s flew over about this time and I transmitted, 'Hello, A-6. I am at your 6 o'clock position.' I still couldn't receive. Joe had a functioning PRC-49 receiver but no transmitter. He could hear the A-6s talking back to me but I couldn't hear them.

"The A-1s were joined by two T-28s which remained the entire morning and at 1130 three helicopters returned. *Waiting for the helicopters to get back was about the longest three hours of my life.* I knew I should move to a more open area but because of the people around me I couldn't. Every once in a while I could hear them in the bushes so I decided to stay put. I decided if the helicopters couldn't rescue me that day I would move that night to an open area and I would probably be rescued the next day.

"At 1130 the helicopters returned and all this time aircraft continued to circle overhead at around 10 to 12,000′. The helicopters were having a difficult time trying to locate me because I was in 30′ high undergrowth. There were two trees almost 50′ high next to me. Earlier, I had told the helicopters that they would need about an 80 to 100′ cable in order to reach me and that I would direct them overhead with my radio but I could never get them to the right area.

"Along about noon, I decided to do a last ditch type maneuver by using a day-smoke signal. I transmitted to the helos that I would use one the next time a helo was directly over me and they could spot me. A helo came over and I lit a smoke and held it up. The crew member in the helicopter saw me and waved to me and I waved back, giving him the roger signal, but the helo kept going. Later, I found out the man who saw me didn't have a headset on so he couldn't pass my position to the pilot. He punched the gunner and pointed to me but the gunner couldn't understand so they missed me with that helicopter. And there I was standing like the Statue of Liberty with that daysmoke signal!

"At this time, I decided to start moving to the northeast along the ridge. I went about 20 yards through the jungle—physically crashing through it like I was running with a football. I got over to this big canopy tree and I radioed to the helicopter that I was directly to the north of the big canopy tree or umbrella tree. This was an ideal location. They spotted the tree immediately and came right overhead.

"The helo was about 80′ above me; it couldn't get any lower because of the tree and the 30′ undergrowth. It seemed like it took an hour for the sling to get to me. The down wash of the rotor blades was terrific; it bent the brush down towards the ground and blew the sling all around. The sling had a weight on it but it got caught in the top of the tree; luckily, they were able to maneuver the helicopter over a little bit to free the sling. The sling came down almost to me, 10′ away downhill. I had to jump for it and dropped my survival kit and radio which I wanted to bring back. It was either not jump for the sling or leave the radio there, so I dropped the radio and jumped and caught the sling in one arm.

"The helo immediately took off swinging me around the tree and out over the valley in the direction from which it had approached. All this time I was hanging there with one arm in the sling while the helicopter was flying 1000′ above the valley floor. It seemed like 30 seconds and about 1500′ altitude before I actually climbed into the helicopter. While I was being hoisted up to the helicopter as it was flying down the valley, the A-1s and T-28s made strafing runs under me to keep the ground fire down. When I got in the helicopter there was Joe sitting on the floor in back. Seeing him in there and being free again was the happiest feeling I've ever had." ◄

FORUM:

Supply Problems

We are unable to get flight gear at MCAS Beaufort (i.e., flight suits, gloves, boots, masks, etc.). In the past year it has taken as long as six months to get a flight suit; the same is true for gloves and other related gear. I have seen pilots have to share torso harnesses and even oxygen masks. The standard explanation from supply is, "It is on order and that is all we can do." This problem has been followed through from squadron level through Wing Supply. I realize supply has a problem with the drain to WestPac, but something should be done to continue stateside requirements. I have had 10 flight suits on order for three months and gloves for one month. I feel if flight safety brought pressure on the supply program we could get more organization and distribution.

CAPT, USMC
VMA

▶ It sounds as if you are keeping up with the problem on the local level. We will keep your comments in mind for discussion at the next Aviation Personal Survival Equipment Team (APSET) meeting.

Chest-Mounted Minireg

Since when is it permissible to chest-mount (K-4 kit) miniature regulators Robertshaw 226-20004-3 and Firewall F2700-1 in any aircraft miniature regulator systems? I know *Air Crew Systems Change 39 Rev B* says it's so.

RIGGERMOUSE

▶ We checked with Aerospace Crew Equipment Department which has cognizance of this under the Naval Air Systems Command Headquarters. ACED says that after substantial testing, it was determined that the abovementioned regulators can be safely K-4 kit chest-mounted in accordance with Air Crew Systems Change 39, Revision B.

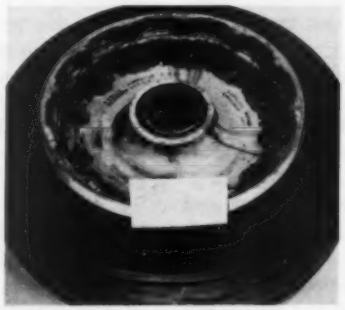
Tire Failures

In a period of three months we have encountered over 100 cases of faulty tires similar to this photo.

During this period we were operating from MCAS Yuma, Arizona and most of our flights were with light fuel loads. Squadron policy was such that pilots were required to roll all the way out on runway 21R (13,000') so very little braking action was required. Our UR serial 0013 is typical of others submitted concerning this problem.

If this could be brought to the attention of someone who might be interested in investigating it further, it would be appreciated.

ASO, VMA-332



Bad batch revealed by UR.

▶ The UR indicated the tires were A-4C equipment, FSN 2RH-2620-051-9925-Y160, and listed the Mfr's Code and Contract numbers. The UR also states that:

1. These were new tires prior to hop when discrepancies were noted.

2. Pieces and often entire tread separated on landings and rollout.

3. All takeoffs were light weight at speed of 115-125 knots.

This problem has been directed to NavAir authorities and investigation is currently underway.

Flight Suits

This letter is in regard to the flight suit situation which exists in the Navy. Basically the problem is simply that the Navy, during my 12 years of flying has never had a flight suit as good, in my opinion, as the USAF summer flying suit which I wear. Right now in my squadron there must be at least six different models of Navy flight suits being worn (orange, three kinds of brown and two kinds of olive drab.) Now we are getting a new olive drab suit from supply with flaps over all the zippers which get caught whenever the zipper moves over ½". During my two tours to Yankee Station, most pilots that I knew either wore fatigues or Air Force gray flight suits. The few people who wore these new olive drab jobs didn't like them. I think the Navy should buy the Air Force summer flying suit; it lasts about three times as long as the Navy suit, is designed for aviators' comfort, and would save the government some money.

SUITMOUSE

▶ The olive drab suit you refer to is the new Nomex flight suit, possibly one of the early models. The Aerospace Crew Equipment Department has informed us that problems of sizing and the zippers catching have been corrected in the patterns for the latest contract. Flight suits are on the agenda of the next Aviation Personal Survival Equipment Team (APSET) meeting.

CSD Servicing

Your reply to ADJ3 G. V. Smithson, VF-13, letter, page 22 of the September issue, "Wonder Where the Oil Went," concerning F-8E CSD system replenishment has created quite a few discussions here.

I for one tend to differ with your answer. NA 01-45HHD-2-1 states the oil level indicating light should be used to determine when and if the CSD system needs the addition of oil.

Do you have a question regarding materials or procedures now in use in Naval Aviation? For an answer send it to FORUM, U.S. Naval Aviation Safety Center, NAS Norfolk, Va. 23511.

After reading correspondence between the airframe manufacturer and the CSD manufacturer I am inclined to follow this practice. Sunstrand states that daily addition of oil increases the possibility of contamination entering the system. NW 03-5FB-70, HMI for CSD, states that extreme care must be taken to preclude the ingestion of contamination into the CSD system. The CSD is capable of operating in a low oil state (I cannot recall the figures) for a few hours without causing any damage to the system.

ANYMOUSE
FPO SAN FRANCISCO

▶ You may not agree with VF-13's practice of replenishing the CSD daily but a comparison of 3-M data over a 4-month period (all the information that is now available) indicates certain points in their favor.

VF-13 had five Maintenance Actions on CSDs—none of which involved contamination of the CSD system. Meanwhile your unit experienced 21 Maintenance Actions, 6 of which involved contamination of the CSD system.

The key seems to be to exercise extreme care whenever replenishing the CSD system to preclude contamination.

Strobe Light

"Out of the Night" in the July 1967 APPROACH brought back to mind a question discussed after the night rescue of an A-3 crew on a recent deployment. The helo pilots mentioned that the strobe light was most beneficial in locating the crew but it had a tendency to cause vertigo as they moved in close for the pick-up.

I would be interested to find out if other helo pilots have experienced similar problems as we certainly don't want to cause those SAR crews disorientation when they are on the verge of plucking us from the hands of the cold, black ocean.

INTERESTED MOUSE

▶ If any of our SAR helo readers have encountered such problems, let us hear from you.

Minimize Mickey Mouse Ingestions

After a plane captain's Mickey Mouse sound attenuators were ingested by an F-8 during functional checks, we adopted the practice of securing the Mickey Mouse ears with a nylon lanyard, the other end of which is secured to the wearer's belt.

As long as jet intakes and Mickey Mouse ears have been around someone may have already made this suggestion; if so, perhaps reemphasis will not hurt.

CAPT T. C. MCCLAY
ASO, VMF(AW)-451

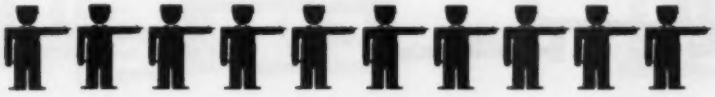
▶ On the first pass we thought it was a good idea but subsequent review of NATSF reports concerning FOD brings to light some interesting questions. Of the dozen or so Mickey Mouse ingestions reported each year, how many are Navy? How many are Marine? How many ashore? How many embarked?

Since CVA/NATOPS directs the use of helmet, goggle and sound attenuators, plus jerseys and flight deck shoes for flight deck personnel, we are inclined to think Mickey Mouse ingestions are rare for shipboard Navy airmen. Marines here say that wearing of helmet-attenuator combinations is not the practice for Marine aviation personnel, either ashore or afloat. These different practices give rise to the foregoing questions.

Our Clothing and Survival experts view the wearing of a lanyard as being an encumbrance which could lead to a number of other accident-producing situations, particularly around ejection seats and ordnance.

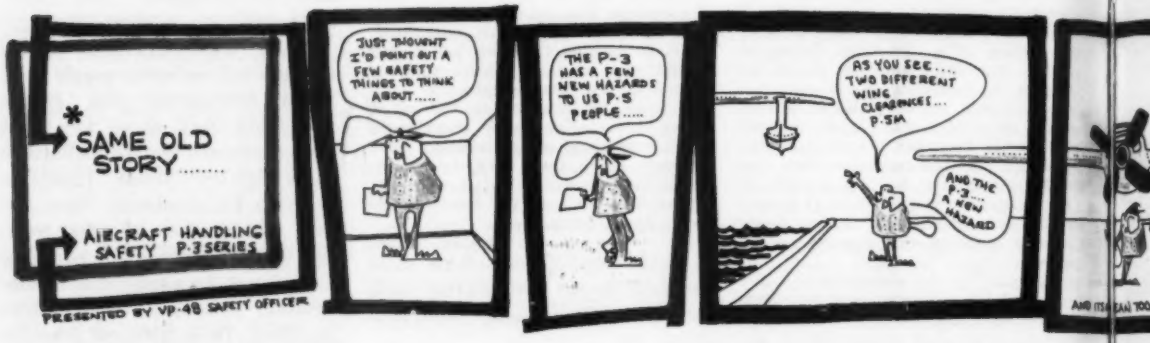
Therefore we have requested NATSF to look into the matter to determine if the statistics can provide guidelines for the best route. Perhaps the helmet-Mickey Mouse combination is best but we need proof positive before we'll hazard any recommendations. We'll put out the word when we get it. ◀

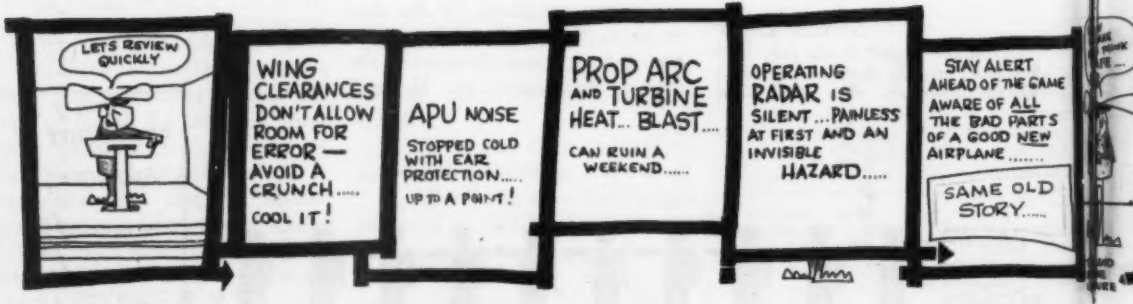
PASS IT ALONG!



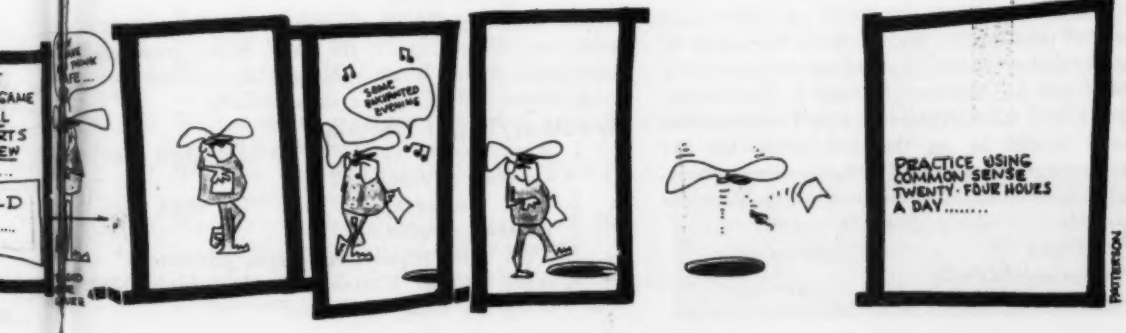
Each copy of APPROACH is meant for ten readers.

An engaging lecture on SO





...os* the Perils of Transition.



ON THE GLIDE SLOPE

The Annual Instrument Exam Checklist

The Naval Aviator's birthday is one of those dates, never avoidable, that marks his steady advance toward grayer hair. It also means that it's time for his annual flight physical and instrument card renewal.

An instrument card is something that every aviator in a flying status is required to have, however inconvenient it may be for him to obtain it. A glance through the *NATOPS Instrument Flight Manual* will reveal the annual requirements which are necessary to qualify for an instrument card renewal. These include instrument flight time, a specified number of approaches, an instrument flight check and the successful completion of a written instrument exam. A big order for the catapult officer on USS CONSTANTLY-SAIL.

The annual bugaboo of most aviators is the successful completion of the written exam. A great many publications exist that concern themselves with the whys and wherefores of instrument flight. Successful digestion of the material in all those books would seem to require a superhuman effort from a PhD in literature.

In actuality though, a few hours of study using the proper publications are all that's necessary to adequately update yourself on instrument procedures. It should also be sufficient for you to successfully complete any of the instrument exams. Every aviation command should be on the distribution list for OpNav Instructions and FLIP Publications. Studying pertinent sections of the below listed publications will provide you with a thorough review:

Publications

1. OpNavInst 3710.7D
   (a) CH V.—Flight Clearance
   (b) CH IX—Miscellaneous Responsibilities of Command Activities
   (c) CH X—General Instructions on Duty Involving Flying and Annual Readiness/Proficiency Requirements.
   (d) CH XI—Air Traffic Control Procedures
   (e) CH XIII—Instrument Flight Requirements and Qualifications
2. Sec II—FLIP Planning Document
   (a) Pilot Procedures Chapter
3. FLIP—IFR Supplement
   (a) Review legend for major military airfield
   (b) Special Notices Section
4. U. S. Gov't—Low Altitude Enroute Chart
   (a) Review Legend
5. FLIP High Altitude Enroute Chart
   (a) Review Legend
6. FLIP High or Low Instrument Approach Procedures
   (a) Review legend
   (b) Review several approaches
   (c) Review TERPs landing minima format on special insert.

The following list of questions will serve as an additional self-review in the three basic areas of instrument flight: weather/flight planning, the enroute phase, and terminal area procedures.

Weather/Flight Planning

1. What weather applies to an IFR flight plan (forecast or existing)?
2. What weather applies to a VFR flight plan (forecast or existing)?
3. What is the requirement for an alternate?
4. What Weather Warning Areas are applicable to OpNav filing restriction?

5. Can you read a sequence report?
6. What is the OpNav fuel reserve requirement?
7. What is the CNO jet restriction for filing into P & FAA fields?
8. What is the VFR/VFR On Top cloud clearance criteria?
9. What are OpNav IFR filing minimums for destination & alternate airfields?
10. What is the difference between an ATC clearance and an IFR flight plan?
11. How do you file a flight plan at other than a military airfield?
12. What is the meaning of OFFL BUS ONLY and PPR for an aerodrome?
13. How do you figure ETE for an IFR or a VFR flight plan?

Enroute Procedures

1. What is controlled airspace and how is it denoted?
2. What altitudes are included in the Low Altitude Airway structure?
3. What is a control zone?
4. What is an Airport Traffic Area?
5. What altitudes are included in the Jet Route Structure?
6. What is the meaning of: MEA, MOCA, MCA, MRA, and MAA?
7. What are the requirements for flight frequency in an Area of Positive Control?
8. Where is ARTCC Sector Discrete Frequency information found?
9. What are the maximum IFR direct, off airways, filing distances between navaids?
10. What are the lost communications procedures for IFR, enroute traffic?
11. When are position reports required and what fixes are to be reported?
12. What is the Interference Free Service guarantee for "T", "L", and "H" class navaids?
13. What airfields are depicted on the High and Low Altitude Enroute Charts in blue and brown?
14. What is the OpNav terrain clearance criteria for IFR flight off airways, direct?
15. What publication lists complete information on all radio aids to navigation in ConUS?
16. What restricted areas may you file through on an IFR flight plan?
17. What are the requirements for IFR flight in uncontrolled airspace?
18. How do you determine the location of the nearest Metro station and its frequency?
19. At what altitude do hemispherical cruising altitudes commence and when do they change?
20. How do you determine the closest Flight Service Station in flight and what frequencies it monitors?

Terminal Area Procedures

1. Are SIDs mandatory on an IFR flight plan?
2. What are the contents of an IFR clearance?
3. What are OpNav takeoff minimums for standard and special card pilots?
4. What are section takeoff weather minimums?
5. What is the procedure to follow if you receive a short range clearance on the filed route of flight, or a short range clearance off the filed route of flight?
6. What is the proper procedure to follow if communications are lost on a radar departure?
7. What constitutes a holding clearance?
8. What is a standard holding pattern?
9. What weather minimum must be adhered to for instrument approaches according to OpNavInst 3710.7D?
10. What is the difference between a straight-in and a circling approach?
11. Can you interpret the new TERPs instrument approach minimums format?
12. Do you know the tower light signals?
13. What is the proper lost communications procedure for an enroute descent?
14. What is the significance of a tacan gate?
15. How is the proper missed approach procedure determined for a radar final approach?
16. When is a GCA waveoff mandatory?
17. How do you determine whether sequence flashing lights are actually installed as part of the approach lighting at an airfield?
18. What is the standard lighting for a military airfield?
19. What are the mandatory voice reports in the terminal area?
20. What is the proper procedure to follow if lost communications are experienced prior to receiving clearance for an instrument approach?

Instead of attempting to memorize great quantities of unrelated facts and figures, simply visualize several IFR flights all the way from the planning stage to final landing. As questions arise regarding procedures, facilities, etc. simply look up the answers and continue. It's surprising how complete a self-review can be!

If you have any questions regarding instrument flight procedures, send them to:

Commanding Officer
VA-127
NAS Lemoore, Calif. 93245

Lessons for All

Following an airframe fire and an explosion shortly after takeoff on a project hop, an F-8E flamed out. The pilot ejected. His account of his survival difficulties and investigators' comments contain lessons for all.

"My altitude at the time of ejection," the pilot recalled after rescue, "was about 2000′. My speed was approximately 200 kts. Ejection seemed normal in all respects except that I was thrown from side to side more violently than I had expected. I saw the seat separate but felt no opening shock as the main chute deployed. Right after I was stabilized in the chute, I looked around and saw my aircraft in about a 90-degree dive going into the cloud layer, trailing black smoke.

"After watching my aircraft enter the clouds, I unhooked the lower right rocket jet fitting and began pulling the raft lanyard out. (*This was incorrect. He should have released the left fitting.—Ed.*) At this time I entered the cloud layer at about 1200′. I decided to wait until I was through the layer to attach the raft lanyard to my torso harness. Once I was through the clouds, at about 300′ I started again to pull out the lanyard. However, I saw I was getting pretty close to the water so decided to wait until I was in the water to deploy my raft.

Becomes Entangled

"When I hit the water, I immediately pulled the toggles on the Mk-3C and felt it inflate. (*The Mk-3C should be inflated during descent.*) I estimate I only went down 2 or 3′ but when I did pop to the surface, I was thoroughly entangled in the shroud lines. At this time the F-4B, which had accompanied me on the project hop, flew over and I gave the pilot a thumbs-up signal indicating I was OK.

"The main chute was approximately 2′ away, completely collapsed. I started to unhook my left riser but encountered some difficulty with the Koch release. I took off my gloves but still had some difficulty getting my fingers behind the bar for release. Once I did this, however, the fitting released with no trouble. I had little or no difficulty with the right fitting.

Can't Reach Shroud Cutter

"After I had released both fittings, I started trying to untangle myself from the shroud lines but it seemed the more I tried, the worse it got. Several times I tried to reach my shroud cutter on the right side of my torso harness next to the center zipper but I could not because the Mk-3C completely covered it. I was just physically unable to reach around the Mk-3C to the position of the cutter. I decided then to get into my raft to see if this would help the situation. (*During this time, although the pilot had not deployed his dye marker, dye was released into the water.*)

"I had no trouble deploying my raft or getting into it. Once in the raft, I was able to reach the shroud cutter and immediately began cutting the lines. In a matter of a few seconds I was completely free of all shroud lines. Then I saw that, while cutting the lines, I had accidentally cut the line connecting the survival kit. Evidently the kit sank immediately because I did not see it after I was free of all of the lines.

"Once in the raft, the first thing I did was take off my helmet and place it beside me, the oxygen mask still attached. When I picked up my helmet, the oxygen hose became entangled in the shroud lines. I was in the process of untangling the oxygen hose when I heard the helo. The helo was only about

a half-mile away so I released the oxygen mask from the helmet and let it sink with the chute. I then got out one of my day/night flares and lit the daysmoke end. (*The helo pilot reported that the daysmoke gave a clear indication of wind direction.*)

Helo Overhead

"In a matter of a few seconds the helo was hovering overhead with the rescue seat about 20′ away. I had gotten out of the raft on the helo's approach but I was unable to swim to the seat. Evidently the helo crew realized this; they picked the seat up and dropped it about 2′ away from me. I had no difficulty getting on the seat or getting into the helo. Once inside, it was only a matter of minutes until I was back at the base."

The pilot's only injuries were minor bruises.

The excellent performance of the helicopter crew and the SAR coordination provided by the GCA crew contributed significantly to the safe and expeditious rescue of the pilot, the squadron C.O. said.

After interviewing the pilot immediately after his return by helicopter, the investigating flight surgeon stated that "it was apparent that he faced the emergency without panic and worked steadily at the survival task."

Survival Deficiencies

Investigation showed that the pilot had attended a water survival training exercise held by the squadron nine months before the accident. Questioning the pilot brought out the fact that he was aware of correct survival procedures. He said he did not attach the raft lanyard because he felt he did not have time and did not inflate the Mk-3C because of apprehension about water entry shock. He simply forgot to put his helmet back on before helicopter hoist.

Survival deficiencies noted by investigators were: the PRT-3 started transmitting 45 seconds after the pilot ejected; the Koch fittings were difficult for the pilot to release; the shroud cutter could not be reached easily with the Mk-3C inflated; the dye marker container failed; and the survival kit was inadvertently lost.

Investigation disclosed no reasonable explanation for the delayed activation of the PRT-3. Shop procedures for checking and installing the PRT-3 were reviewed and all current directives were being complied with. The pilot's difficulty in releasing the Koch fittings was felt to be a problem primarily based on the lack of experience; the squadron had had the fitting only six weeks. Questioning many of the squadron pilots confirmed that flight gloves can cause difficulty in releasing the Koch fitting. However, the majority felt that as they gained experience in operating the release, the tendency of the flight glove to catch in the fittings would be reduced.

The shroud cutter container was, in this case, sewn to the torso harness in an area difficult to reach once the Mk-3C was inflated. Alternate areas for and methods of retaining the shroud cutter were investigated by the squadron. (*The latest Mil Specs for the flight suit includes provision for a shroud cutter pocket. Clothing and Survival Equipment Change 26 recommends that the shroud cutter be installed on the SV-2 vest.—Ed.*)

Dye marker packets after reaching an undetermined age will begin to crack and lose watertight integrity, investigators noted. In this case, the unscheduled deployment of the dye marker was of some help during the rescue effort, helping orbiting aircraft to keep the pilot in sight. However, investigators stated, unscheduled deployment of the dye marker in unfriendly waters could prove to be disastrous.

After the accident, the squadron looked into several means of marking the survival kit line for quick identification to prevent accidental cutting. Dying the line a bright color offers an excellent identification feature for day survival, the squadron states, but obviously is of little value at night. Consequently, colored tape was substituted for the equipment container shroud line to create a contrast to the parachute shroud line. However, there is no guarantee the line will not be cut when hastily severing tangled lines, investigators observed.

Survival Recommendations

The investigating flight surgeon made a number of recommendations in the survival area:

- Survival training should approximate the real thing as closely as possible, i.e., deep water training wherever possible, training in full flight gear including wet gloves, all squadron modifications, etc. The flight surgeon noted that since the pilot had been aboard, a deep water survival program had not been available locally.
- Survival gear should be secured with colored tape to minimize the possibility of inadvertent loss. The tape can be distinguished from parachute line visually by day and by touch at night.
- Dye marker packages should be inspected for cracks which would allow inadvertent dispersal of dye. Dye markers are supposed to be inspected visually every 90 days.

In addition, any items a survivor must use in the immediate water survival phase should be mounted well above the waist area; otherwise, the inflated Mk-3C will cover them. If survival items are below the Mk-3C, the pilot or crewman, as in this instance, will most probably not be able to reach them. ◄

SAFE (Sleep, Attitude, Food, Equipment)

The other night yours truly, ole Brokenbones, and my buddy P. Wellington Skagdragger had occasion to consume about 5000 of the Carolina Coast's finest fish and lap up a few ounces of the California grape juice, and as is our wont, we got to talking about the old days.

As the wives clucked contentedly in a corner, disclaiming all knowledge of anything back beyond 1936, the sea stories began to fly thick and fast, most of them about pilots. Just as we had both concluded, philosophically, "Those were really men in them days," it occurred to both of us that maybe the reason we had felt that way is because darn few of them are still around, smashing bugs and boring

holes in the sky. This launched a long discussion of pilot types. We scratched some notes on the back of a napkin with a toothpick and, for what they're worth, here are some of our thoughts:

Back in the early days of aviation there was something mysterious about an aviator. First of all, anyone would tell you, it took a fellow who was basically an idiot to climb in one of those crazy things and go off into the sky with nothing holding him up. And the aviators dressed, looked and acted the part. They affected strange getups, and did all sorts of things to perpetuate their image, like flying through barn doors and walking on wings. Maybe a lot of this was an effort to get rid of some of the anxiety they felt when they looked at that heap of baling wire and doped silk, and wondered if it'd hold together one more time. They were temperamental about their airplanes. They had to be. And in keeping with the part they were playing, many of them were temperamental about themselves.

Then came a couple of odd wars, and a lot of romance went out of the public attitude toward aviators. Even the military services began to allow as how they wanted them to act like all the rest of the people, and with a respectable amount of resistance and grumbling, they did.

But the big thing was that people from all over, from every possible background, began to fly. It soon became very fashionable to adopt an attitude of "I can fly anything with an engine in it"—an attitude about which legends were built during the wars. Very few of the old reliable types ever had this attitude, but it caught on with a few people, and it became contagious. It was sort of romantic and daring, and it provided jobs for a whole bunch of medical types who called themselves flight surgeons. The "Flight Docs" soon were busy trying to dispel this unhealthy attitude.

When the people up at Igor's place and the other makers of planes built that aircraft for you, they bolted to the panel a little thing called a check-off list, realizing that people being what they are, if such a list was put in a position of maximum availability, people might use it, and this might save a broken airplane or two. People do use this list. It does reduce accidents!

The medics are now busy trying to determine the best site to tattoo a personal checklist on each pilot. They are encountering some degree of resistance. So from now until the day you quit flying, you'll hear the flight surgeons screaming long and loud about this personal, human type checklist. P. Wellington Skagdragger has one he always uses, and it's so simple that even he can remember it without a neon sign to twit his memory. Let's go over it and see what *you* think of it.

First item on the list is *sleep*. You should have at least seven or eight hours of sleep the night before, maybe more, depending on your individual needs.

Along with this goes general physical condition, good muscle tone, moderate exercise and no excess weight on the frame. That seven or eight hours of sleep supposes an equal amount of time without any effect or trace of alcohol in your system with toxic end products to hang on and reduce your efficiency. If you had to be carried to bed, then eight hours of sleep wasn't enough for you. All you were doing all

that time was oxidizing alcohol. Come next morning, your frame is just beginning to repair some of the damage it sustained. It isn't even nearly ready to go aviating yet.

Next thing listed is *attitude*. As sleep encompasses a lot of related things, so does this item: your basic attitude towards flying on that particular morning. What influenced it? Have a fight with the wife? Kids spill jelly on your freshly cleaned shirt? Get chewed out by the skipper? Car payment overdue? If you find your mind a mess of worries, you can't check this item as safe. If your attitude of the moment is enough to keep you from devoting your full attention to the job, then just stop right there and execute that famous 180-degree maneuver right there on the mat and go back to the readyroom. There also may come a day when this whole flying business has got you filled up to *here!* If this ever hits you don't brood about it alone. Go talk to your C.O. and your flight surgeon. Many times these things can be talked out. It is a wise man who talks about it instead of stewing about it. "Stewing" never did an aviator any good.

Another item is *food*. Did you have a good breakfast rather than a doughnut and a cup of coffee; a

cigarette and coffee; just a cigarette; or nothing at all? You can't run without that precious blood sugar, and you can't get it unless you eat that breakfast. So shake the wife out of the pad and shove an egg and a skillet into her hand and tell her to "get fryin!" Or set the alarm 30 minutes early so you can stop at the mess for breakfast on your way to work. But don't try to operate without fuel.

Finally, check on *equipment*. Is yours all present and accounted for? Or did you leave your knife at

home after you used it to clean those fish? Today it would be just your luck to have to use it. What kind of shoes are you wearing? Would you like to walk home in them? When was the last time you preflighted your mae west? Do you have a survival kit? What would you do if you were forced down in the booneys? Check that equipment with loving care.

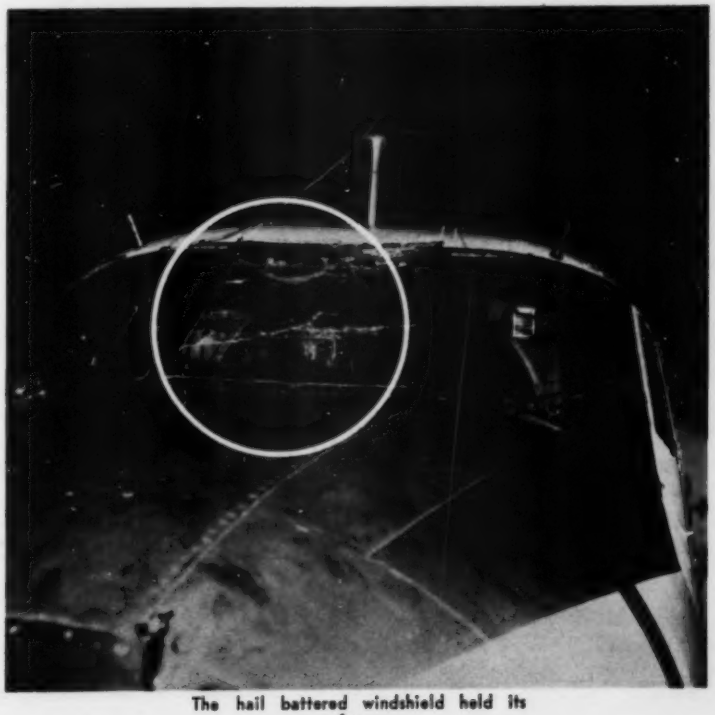
Just four items: Sleep, Attitude, Food, Equipment. That spells S.A.F.E. Check this list as though your life depended on it. It does! ◄

Hail dented the leading edge.

Hail, Hail, It's Hard on Aircraft

The pilot filed a combination VFR/IFR flight plan in a UC-45J. Thunderstorms in the area necessitated the dual clearance. Ultimately a thunderstorm was entered at 10,000′ and shortly thereafter, the aircraft received a short but severe battering by hail. The front part of the center section of the windshield was battered but the shatterproof feature held as advertised. The leading edges received numerous dents along with other unnerving damage. Fortunately, the aircraft was still able to keep going and a safe landing was accomplished.

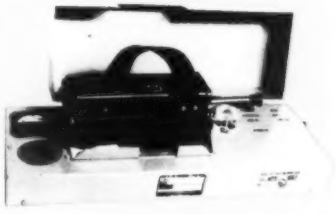
No completely accurate method has been found for determining the presence of hail within a thunderstorm. So when you are approaching a thunderstorm, you have an important decision to make. You must decide whether it is possible to circumnavigate the storm to avoid it, or whether your mission is important enough to warrant going through.



The hail battered windshield held its form.

The battery tester, TS2530/UR, is designed to test the batteries of the ACR RT-10 and AN/URC-10 radios, the ACR SDU-5/E strobe light, and, when a special adapter is used, the AN/PRC-63 radio. (It also tests the Air Force AN/URT-21 and AN/URT-27 beacon sets.) The tester requires no power to operate other than that which is received from the battery under test.

The TS 2531/UR "go-no-go" transmitter tester is a self-contained unit requiring no external power. It provides a method of operationally checking the AN/URC-11, AN/URC-10 and RT-10 radios as well as the Air Force AN/URT-21 and AN/URT-27 beacon sets.



THE two instruments shown in the accompanying photographs are the TS25430/UR battery tester and the TS 2531/UR "go-no-go" transmitter tester.

The battery tester is a self-contained unit designed to test the batteries of the ACR RT-10 and AN/URC-10 radios, the ACR SDU-5/E strobe light, and, when a special adapter is used, the AN/PRC-63 radio. (It also tests the Air Force AN/URT-21 and AN/URT-27 beacon sets.) The tester requires no power to operate other than that which is received from the battery under test. The battery tester represents as a minimum, a nominal transmitter load to the battery under test.

The life of the battery is determined from the graphs supplied for each battery type. Data cards and an operating instructions card come with the tester. The tester is calibrated and encapsulated at time of manufacture; no calibration of any part is required for the life of the equipment.

The "go-no-go" transmitter tester is also a self-contained unit requiring no external power. It provides a method of operationally checking the AN/URC-11, AN/URC-10 and RT-10 radios as well as the Air Force AN/URT-21 and AN/URT-27 beacon sets. The output is registered on a meter which indicates either "Accept" or "Reject." Also provided is an audible output to indicate proper tone modulation of the radio or beacon set under test. This tester is for detecting failed or severely degraded equipment only.

All electronics circuitry on the tester is calibrated and encapsulated at time of manufacture and the read-out meter is hermetically sealed. Thus the tester either functions or does not function. No service, maintenance or calibration is required for this tester. Normally use of this tester will not cause interference if instructions are followed. However, if operation of extremely sensitive equipment is affected by the presence of the tester, this interference may be reduced or eliminated by grounding the tester frame from the terminal provided.

For more extensive information on these two testers see *Personal Survival Equipment Crossfeed*, December, Part 1.

As of this writing, 50 each of the battery testers and "go-no-go" testers have been sent to ComFairWestPac, NAS Atsugi.

notes from your flight surgeon

Visual Signals

SUCCESSFUL rescue can depend on ability to signal.

Of four ejectees after a mid-air collision, only one carried what the investigating flight surgeon considered an adequate supply of signalling devices. Three had only the standard four flares (two in the Mk-3C life preserver and two in the seat kit). The fourth man had, in addition, two Mk 79 Mod 0 pencil flare kits with seven cartridges each.

General NATOPS (OpNavInst

371(7D) states "All crewmembers in combatant aircraft and single engine training aircraft shall carry a pistol with tracer ammunition for all night flights, and for all flights, night or day, over water or sparsely populated areas. An approved signaling device is authorized as a substitute for the pistol when operational and/or security conditions warrant. The carrying of such an approved signalling device in all other Navy aircraft is encouraged." *(The Mk 79 Mod O pencil flare kit is an approved signalling device.—Ed.)*

Flotation Troubles

"CORRECTLY functioning safety and survival equipment may not prevent an accident but it may save your life if you have an accident," an investigating flight surgeon recently stated in his report on a UH-34D ditching.

The crew chief in the aircraft in question had embarked on the overwater flight knowing that his life vest CO_2 cartridges had both been accidentally expended the day before. He had made an attempt to get new cylinders but the equipment office was closed at the time. When flight quarters sounded, he went directly to his aircraft. During the seven minutes in the water before rescue, he tried to inflate his vest orally but got so much water in his face and tired so rapidly that he gave up.

"Any crewmember who does not insure that his survival equipment is in perfect working order is inviting disaster," the flight surgeon observes.

In the same accident, the pilot was able to inflate only one chamber of his Mk-2 life vest. Later, it was found that the other CO_2 cylinder container cap was not screwed down tightly. Consequently, the CO_2 cylinder was not punctured when he pulled the toggle. The pilot had last preflighted his life vest a week prior to the accident.

When the pilot tried to inflate the third chamber of his Mk-2 orally, he neglected to remove the oral inflation tube from its retaining loop. As a result, he too got so much water in his face and mouth that he gave up.

As has been said many times before, the best survival equipment in the world won't do you any good if you don't have it with you or if you don't use it right.

Shower of Glass

AT the completion of a high mach run, the canopy plexiglass of an F-8A blew out. The pilot was showered by flying fragments of plexiglass but was uninjured due to his flight clothing and the fact that he was flying with his APH-5 visor down. The suspected cause of the incident is that "old type" cast plastic was installed in the canopy. No scratches, cracks or crazing were evident prior to flight and there was no evidence of inflight contact with birds or debris. In addition to recommendations concerning replacement of the plexiglass with new type glass or stretched acrylic plastic, the squadron recommends that the need for flying with the helmet visor down again be re-emphasized.

RSSK-3 Kit

DURING the over-land parachute descent after a midair collision between two T-2As in formation flight, both student pilots tried to get rid of their RSSK-3s. One could not find the seat pan release handle; the other unbuckled one hip rocket jet fitting. When interviewed, both pilots indicated concern that the seat survival kit might interfere with parachute landing. Investigators concluded that the pilot's knowledge of the deployment and use of the RSSK-3 was insufficient.

The *T-2A NATOPS Flight Manual* states: "If over water, inflate life preserver, then pull survival kit release handle to deploy and inflate life raft." Procedures over land are not specifically mentioned. ◄

"I call it 'Ode to the Bounding Main.' Would you like to hear it?"

HIGH PRESSURE

What is generally considered a routine and simple servicing matter deserves more critical attention than it sometimes gets!

We don't mean to blow things out of proportion but here are some facts on tire inflation that should startle even the most seasoned aircraft maintenance technician.

Over the years tire inflation techniques have appeared on these pages regularly, posters have been printed and warnings have been posted on equipment—yet people are blowing themselves and equipment to bits.

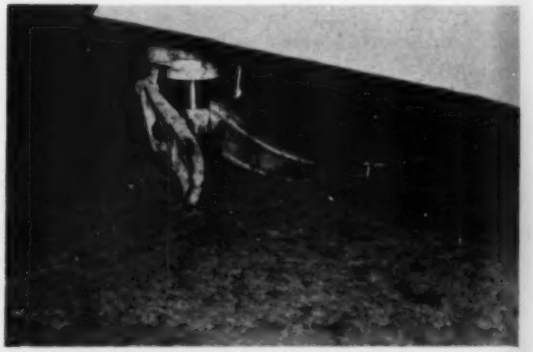
Over the last few months these cases came to light which prompt this review of tire inflation care, high pressure air and equipment. For your own personal safety, *please read and heed.*

Case 1 During tire-buildup for an A-4 a rated mechanic attempted tire inflation using a high pressure air source aboard ship without using a tire inflation cage (one was available). The tire and wheel exploded inflicting fatal injuries to the mechanic.

Case 2 To inflate the nosewheel of an F-8 a relatively young but experienced mechanic used the high pressure side of a TUD-80 air compressor. On taking a pressure reading with the standoff inflator gage a reading of 600 psi was recorded. Not believing this, he decided to cross-check the reading with a hand-held gage. As he did so, the wheel and tire exploded severing both forearms and fracturing one of his legs.

Case 3 A commercial airline report of a similar experience is mentioned at this point which raises the question: What to do with an overinflated tire, known or suspected to be well over the limits? First, let's review what happened.

Upon servicing the nosewheel with an air bottle, a pressure check was made with a hand-held gage. Tire pressure was found to be in excess of the



Case 2: Exploding F-8 wheel spread nose gear levers.

Despite the warning, hi pressure air was used.

AIR CAN KILL YOU!

Press lever to inflate. Release lever for instant reading. When necessary, open bleeder valve to bleed off possible overinflation.

capacity of the gage. The mechanic was about to relieve the pressure by depressing the tire valve core when the tire exploded causing extensive damage in the area of the nosewheel bay, without injuring the mechanic. Investigation indicated the mechanic had failed to check the pressure regulator setting and, as a result, high pressure air was forced into the tire. Now back to deflation techniques.

To deflate the tire, if you are using a remote inflator gage as you should be, the process is simple. This is accomplished by opening the deflator valve shown in the above illustration. *Otherwise, keep clear of that bomb.* Deflation may have to be done with a long spear with the operator approaching the wheel and tire from either a fore or aft direction. Never approach the wheel assembly from a direction in a line with the wheel axle—better to ruin the tire than to ruin your life.

Case 4 Again, an F-8 nosewheel was involved. This time the mechanic used a 1000 psi nitrogen bottle to inflate the tire. He set the pressure regulator at 200 psi and opened the valve. The tire instantly blew apart with such force that the nosewheel levers were bent outward. (See photos.) The man was not injured but the aircraft and two other *Crusaders* parked on each side were damaged by the exploding

Case 4: F-8 suffers the same fate as Case 2—note similarity in damage. Pressures approximated each other.

. . . one of the two adjoining *Crusaders.*

wheel fragments. Investigation revealed the 200 psi gage was in error by 400-600 psi. *See references for calibration.*

Case 5 The main landing gear wheel and tire disintegrated on a T-28 when high pressure air from an air bottle was used by a seasoned mechanic to inflate the tire. While preliminary reports did not indicate the extent of injury or damage, this case is cited to indicate that high pressure air is no respecter of an individual's rating or model aircraft.

Precautions

In view of Case 4, and this not the first time defective regulators have revealed themselves in this way, a daily inspection of air compressors, air or nitrogen bottles for preventive maintenance purposes should be required to insure proper functioning. A qualified AS rating could be well utilized for this purpose.

Inflation booths and pressure sources—

▶ Inflation of tires on wheels not mounted on an aircraft should be performed in a tire inflation booth.

Approved shop tire inflation cage. Operating instructions are posted in conspicuous place.

Tires on wheels which are mounted on aircraft should be inflated using the remote controlled inflator gage.

▶ Basic information for safe operation of the equipment should be conspicuously placed on the equipment for ready reference.

▶ Before attempting to operate equipment with high pressure capability make sure it is equipped with a pressure reducing regulator which limits the pressure to a maximum of 500 psi.

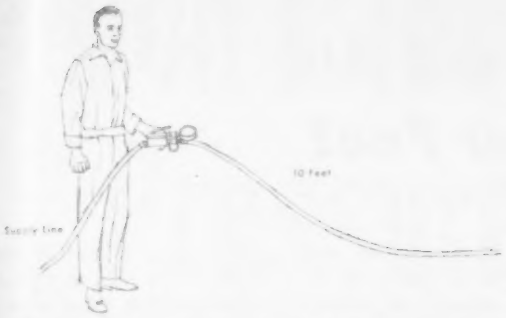
▶ Ensure that high and low pressure valves are properly identified.

▶ Ensure that inflation hose couplings are properly secured—to the low pressure air—to the inflator gage and to the tire valve connectors—a whipping hose can beat you to death.

▶ Always use a remote control (stand-off) inflator gage which meets the requirements of Mil-G-8348. Discharge hose length must be 10 feet. See Federal Stock Numbers for approved gages listed on next page.

▶ Clear the area within a 20-foot radius of the tire inflation station of any loose objects which might be a potential missile hazard. Clear other personnel out of the area.

▶ Stand as far away from the tire as the hose will permit. See illustration.



Before operating gage stand back full length of gage hose.

▸ Open the low pressure valve slowly.

▸ Use the dead-man grip feature of the inflator gage unit and slowly inflate the tire in 10 psi increments until the desired pressure is reached.

▸ Allow the tire to stabilize for a few minutes before removing the inflation hose from the tire valve stem.

Adoption of the foregoing tips should be helpful in avoiding tire inflation mishaps such as those cited. Remember that job completion pressures, real or imagined, bolster the temptation to cut corners. It is the mark of the pro to resist such temptations, and to use all of the safety features available to safeguard life and limb. Additional information is available in the references listed below. ◄

- NavWeps 04-10-506, Technical Manual for Tires
- Military Specification Mil-G-8348 (Inflation gages)
- NavWeps 00-80T-96, Aircraft Support Equipment, General Handling and Safety Manual
- NavAir Inst 4355.4 Navy, Calibration Program, 26 Aug 1967
- Film, MN 10056, Aircraft Tire Maintenance
- Film, MN 9630, High Pressure Gases in Aviation (Hazards of High Pressure Air)
- "Tire Servicing," APPROACH Nov 1965 pp 36-41
- "Know Before You Blow," APPROACH Dec 1962, pp 52-53
- "A Look at the Tire Problem." APPROACH Dec 1962, pp 34-37
- "Treat Them Like Bombs," *Weekly Summary* 19-25 Jan 1967

A Part of the Problem?

The following is excerpted from a recent Anymouse Report.

Your "Tire Failure" article in the *Weekly Summary* of 10-16 September 1967 prompted this flag-rank command to conduct a spot check of three ready-for-flight F-4s in two separate squadrons. The result of this inspection revealed the following:

a. Tire pressures on aircraft were either under minimum or over maximum required for weight involved.

b. Neither squadron had in their possession a usable remote (stand-off) tire inflation gage, nor were any on requisition.

FSN for Remote Control Inflator Gage Mil-G-8348

RD 4920 979 6263 S030
RD 4910 836 1510 S030
RD 6685 979 6263 S030

You Write the Caption

Another Anymouse sent this photo captioned:

Subj: Blown nose wheel on an A-3B.
Location: Flight Deck at Sea.

In short, there's a long story here. Ed.

Compressed Air -Friend or Foe?

Compressed air, when misused, can be extremely dangerous. Injuries can occur . . .

- through failure of the hose or fittings which could cause the hose to whip dangerously and possibly propel parts of the fittings through the air.
- through the blowing around of dust and small particles which would constitute an eye hazard.
- through the introduction of air pressure into one of the body cavities, either accidentally or through horseplay. Air under pressure will pass through clothing and may cause agonizing internal injury that is often fatal.
- through the introduction of a strong air stream into body tissue, usually through an existing cut or scratch. Air can actually rupture cell tissues and cause severe wounds.
- through the injection of minute foreign bodies into the skin due to impurities which almost always exist in a shop air line.
- through falls which result from tripping over air lines which are thoughtlessly left lying on the floor.

An air hose should be considered a special tool. Under no circumstances should it be used as a substitute for a brush to clean machines, clothing, or your person. Any form of horseplay should be prohibited with severe penalties for violation of the rule. In those cases where an air hose is essential for blowing out fixtures and jigs, eye protection must be provided and the pressure maintained at a maximum of 30 psi. It is also desirable to place screens around work to confine the blown particles.

The National Safety Council has published the following general safety rules for working with compressed air.

- Use only sound, strong hose with secure couplings and connections.
- Be sure that there are no sharp points on metal hose parts.
- Close control valve in portable pneumatic tools before turning on air.
- Before changing one pneumatic tool for another, turn off air at control valve. Never kink hose to stop airflow.
- Wear suitable goggles, mask, protective clothing, or safe devices.
- Never use air to blow dust chips from the hair, clothing, or work bench.
- Never point the hose at anyone. Practical jokes with compressed air have caused many painful deaths.
- When using compressed air, see that no nearby workers are in line of airflow.

Improper use of compressed air lines is a problem of growing intensity. You are urged to review your operations now to ensure that actual operating practices are consistent with sound safety practices.

HAZARD—Cleaning parts held in the hand.

HAZARD—Disconnecting a tool or coupling with line pressure on (or while residual pressure exists).

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Don't let High Pressure Air kill YOU!

Just 19 minutes of your time spent in viewing one of the best documentary films on the subject of **Hazards of High Pressure Air** may possibly save **your** life or that of your shipmate.

Film MN 9630. . .

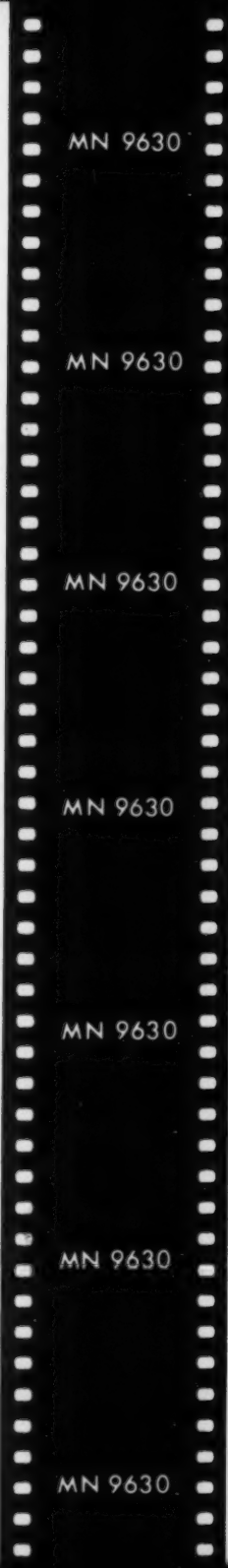
in color and sound, produced under the direction of the Chief of Naval Operations, presents the dangers in handling high pressure gases — why gases are dangerous — teaches the proper use of compressed gases and the correct procedures for servicing aircraft and related weapons systems components.

Film MN 9630. . .

is available from your nearest Training Aids Film Library . . .

Don't delay — Order a print today!

P. S. While you're at it, take the time (20 min.) to view **MN 10056, Aircraft Tire Maintenance** *— the package should bring all hands up to date on Tire Safety.*



NOTES

and comments on maintenance

Boil and Bubble! Toil and Trouble!

WHILE working with a nose radome repair kit, a mechanic created something similar to witches' brew when he added primer to the remainder of a mixture of resin and catalyst that had failed to set properly. (Failure of the mixture to set may have been due to the fact that the instructions were not followed because the instructions were either lost or omitted from the kit.) After an hour had passed, the mixture still failed to show signs of setting up, so it was vigorously stirred—with no apparent bad effect. Several minutes later, however, the mixture started to foam and smoke. Seeing this, a man grabbed the container to move it outside. As he did this, some of the contents foamed over onto the man's exposed hands, and he suffered severe and painful burns.

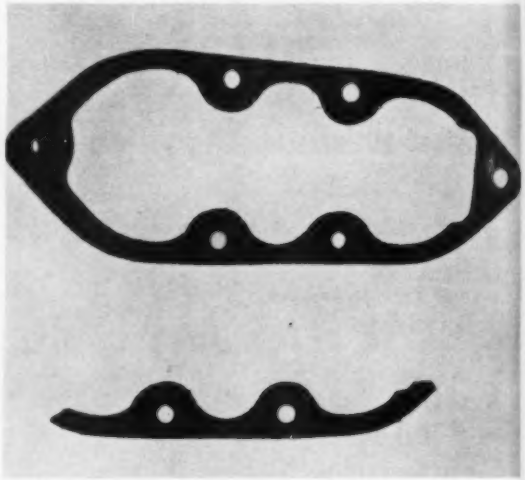
Although the sequence of events leading up to this unfortunate incident seems to be a comedy of errors, the fact that the man was burned is not so funny, and it again emphasizes the need to observe the safety precautions and techniques for handling epoxy resins. Personnel should be advised that primer is never to be added to a mixture of resin and catalyst . . . and that anyone who handles the material should wear protective gloves.

In any case, the instructions should be followed to the letter. In addition to the instructions that are supposed to be furnished with the kit, there is also a set of instructions with appropriate cautions and warnings in the *Structural Repair Manual (NavAir 01-85ADA-3-1).—Intruder Newsletter.*

Too Much Gasket

IS MORE than one gasket better than just one? Not on the rocker box cover of an R1820-82A engine.

A recent one-hour test flight on a squadron S-2E out of calendar check was uneventful except for three gallons of oil the port engine discharged into the engine accessory section and along the outboard side of the nacelle.



Red lighting requires careful eyeballing . . . .

Power plant check work had been performed at night in the hangar bay of a CVS under red light conditions. In the process, a new gasket was placed over the partially removed old gasket. See photograph.

The degradation of any seal by using anything other than *one* good gasket is obvious. The mechanic who performed the work later spent two hours wiping up the oil after the flight under the supervision of the Quality Control Inspector who kept a supply of clean rags handy.

—LCDR T. W. Entwistle, ASO
AIRASRON 28

Object Lesson

A PILOT strolling on the flight deck casually looking over the aircraft noticed a 2" diameter blood spot in the starboard intake of one of the

FOD is POD

A 3/8" combination open-end and box wrench left adrift in the airframe of an A-4 was determined to be the most probable cause of this Alpha-Alpha accident.

The aircraft, with its pilot impacted the ground at an airspeed in excess of 300 kts. Although there was extreme aircraft disintegration, evidence was sufficient to indicate the pilot did not attempt to eject.

Among items found in the crash site was a deformed combination wrench. Its deformation conformed with the contour of the grooved periphery of the aileron power sector assembly. An emission spectrographic analysis and spot test disclosed matching aluminum alloy smear marks on the lower surface of the wrench. Also matching carbon steel marks found on the upper surface of the wrench indicated that a control cable had crossed over the wrench.

The evidence supports the conclusion that the wrench was trapped between the control cable and sector periphery at the time of impact.

It was not determined when the wrench was left in the aircraft or who had left it there.

Investigators concluded the most probable cause of this accident is that a wrench, inadvertently left in the airframe, was trapped in the sector assembly of the aileron power mechanism causing a control malfunction. The pilot, recognizing a control problem, attempted to remedy the situation by disconnecting the power boost control system. The A-4 NATOPS Manual states that if the power control system is disconnected above 300 kts, the aircraft is subject to strong wing-dropping tendencies. The loss was attributed to a foreign object.

As one observer puts it, whatever descriptive term we put on the front of this problem called Object Damage—be it Foreign, Forgotten or Fallen—it always come out Failure. Failure of an important part of our accident prevention and maintenance programs to eliminate Preventable Object Damage.

After every maintenance action, a tool count is a *must*.

A-4Es which had been hoisted aboard just the day before.

A closer look revealed feathers on the first stage compressor blades. A complete FOD check of the 1st, 6th and 13th stages showed no damage. The intake duct was little more than scratched. Comparing these facts with those of other bird strikes led to the conclusion that a small bird was ingested during taxi, or less likely, during takeoff or landing. Anything faster would have torn the duct metal.

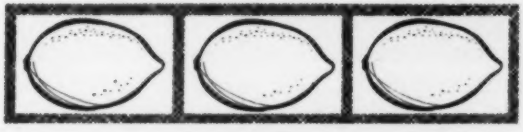
While prevention of this type of incident is difficult, the lesson here is that detection should have been reported on postflight.—*R. W. Hill, VA-83*

Amen.—Ed.

A Matter of Balance

A CALENDAR inspection of an A-4C was being conducted in the hangar. An airframe service change was in progress wherein items removed were; the engine, ASQ-17 package, ejection seat and fuel cells. This left the fuselage in a tail heavy condition. When a man climbed upon the horizontal stabilizer to remove access panels, as should have been expected, the tail section banged down hard on the concrete floor. Damage was extensive.

A-4C Handbook Maintenance Instruction, NavWeps 01-40AVB-2 was ignored because a tail support stand should have been installed. Further, calendar inspection was allowed to commence without first placing the aircraft in the configuration compatible with the check sequence as specified in Sequence Control Chart NavWeps 01-40AVB-6-5.



Two-Armed Bandit

NUMBER two on our C-118 developed a bad cough so we punched her out.

Investigation revealed the necessity for a cylinder change. As the crewmen were placing the new jug over the piston, an undetermined number of coins fell out of the mechanic's unzipped flight suit pocket and into the engine crankcase.

While the crewman's financial loss was but a few cents, the loss in aircraft availability, engine overhaul and shipping costs, not to mention the man-hour loss, amounted to a fair jackpot.

—LCDR R. W. Martoski, VR-24

Remember the jet maxim "Crawl in Clean"?—Here's reason enough to apply the practice when working on any aircraft.—Ed.

RIGGER NOTICE

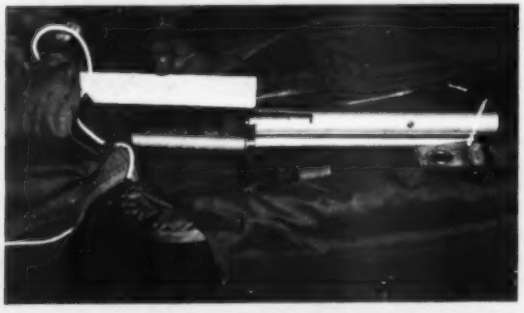
Use the right barrel for the right actuator.

During acceptance check of an aircraft this parachute discrepancy was found: Actuator, Master Specialties 1000D (photo 1) had the wrong barrel assembly installed. The barrel was from a Master Specialties 1000C. A clue that something was wrong, was the fact the receiver assembly when put into the housing protruded about a quarter-inch.

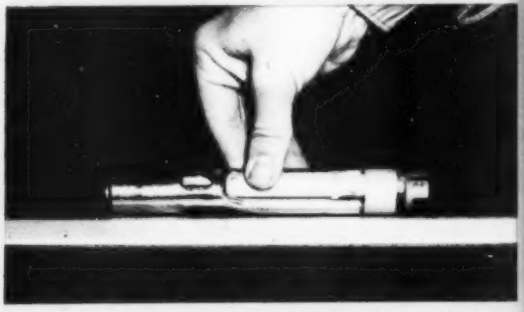
Photo 2 shows the actuator with correct barrel assembly installed and Photo 3 compares the two barrel assemblies.

In this case the actuator would not have worked because the firing pin could not strike the cartridge, precluding automatic deployment of the chute. With this arrangement the chute could only be deployed by manual means.

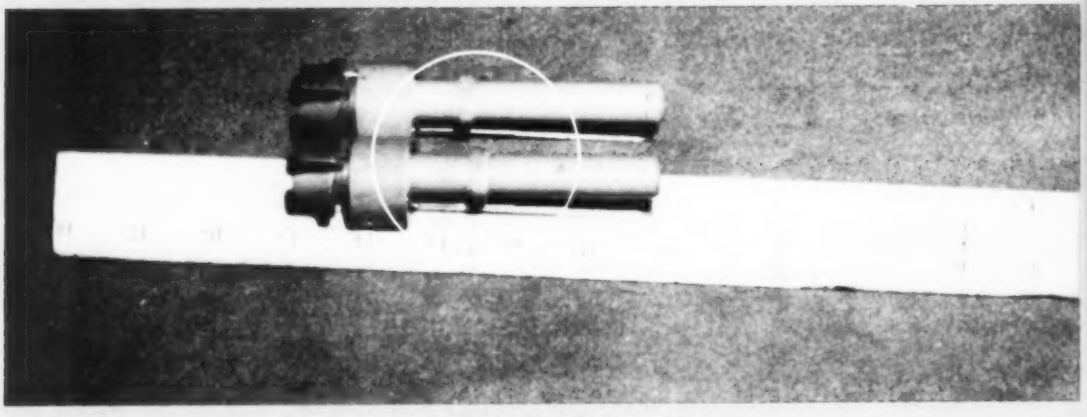
—Contributed by Capt. E. R. Moore, ASO, VMA-332



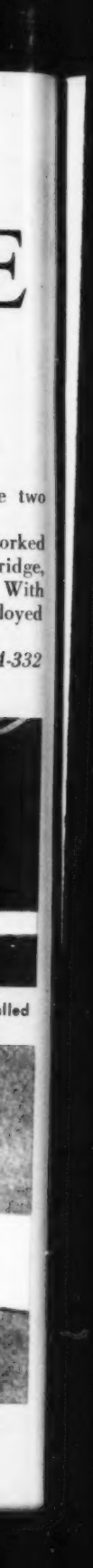
1. Receiver assembly from 1000C actuator protrudes ¼" from the 1000D cover assembly



2. 1000D receiver assembly with correct barrel installed



3. Comparing the barrels—there is a difference!



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MURPHY'S LAW*

1.

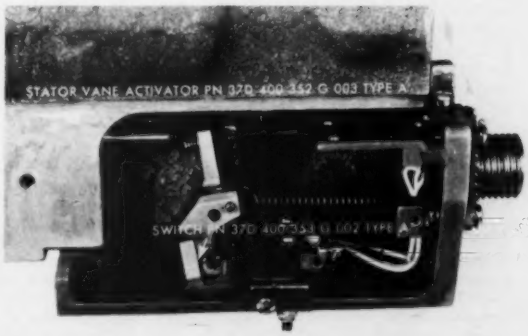
H-3 Stator Vane Activator Murphy

FOLLOWING an engine change the H-3 was test flown satisfactorily. On the next flight No. 1 engine was extremely slow during lightoff and acceleration to ground idle. A flat pitch check indicated little, if any power output from the No. 1 engine.

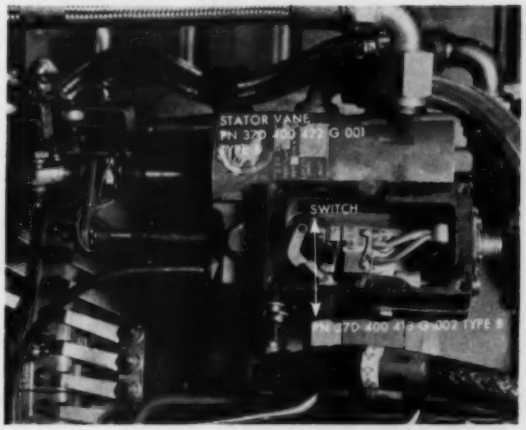
It was determined that during engine buildup, type A stator vane actuator (37D 400 352 G003) and the corresponding accessory drive engine overspeed protection switch (37D 400 353 G002) had been incorrectly installed (photo 1). Photo 2 shows the correct installation. Readers are reminded that HSI NavWeps 02B-105 AHB-2, figure 2-40, paragraph 2-121 cautions against just this type of Murphy.

This Murphy can be further compounded by the fact that the H-3 has two types of Stator Vane Activators: Type A, mentioned above, and Type B, 37D 400 422 G001 (photo 3). Each has a different accessory drive engine overspeed protection switch. Type B calls for PN 37D 400 413 G002. Use of either type requires the right combination—a mismatch will result in engine failure.

—Contributed by LCDR E. R. Kirk, ASO, HS-11



2.



3.

* If an aircraft part can be installed incorrectly, someone will install it that way!

Letters

Contingency Helo SAR Signals

NAS Lakehurst—In your "Notes from Your Flight Surgeon," November 1967 issue, in an item titled "Good Thing," a SAR helicopter crewman reported his difficulty in performing a rescue with no ICS. He managed to complete his rescue using a second crewman to communicate with the pilot. This was good headwork on his part. However, if there had been no second crewman, the rescue might not have been a success.

This is a possibility facing all helicopter crewmen and one which could conceivably result in the failure of a rescue and possible loss of life. The crewman in most cases is the only person in visual contact with the survivor and the pilot relies on his directions. The dangers of a no-ICS rescue could be greatly reduced through use of a standard set of No ICS procedures. These procedures, of course, would vary with type of aircraft.

Since NATOPS does not include this possibility in emergency procedures, we here at Helicopter Combat Squadron FOUR have standardized a set of hand signals to be used within our command. We have included this in our aircrew training and each crewman must perform a No-ICS hoist as part of his Stan check. We have successfully used these signals for one year and have submitted them through our NATOPS standardization officer to HC-2 for NATOPS evaluation.

The only difficulty we have experienced is that in the CH-19E the crewman must lose sight of the target each time he gives a signal. I am enclosing a copy of our signals and would like to hear from other helicopter commands on this subject.

PRI W. D. MCCRAW
AIRCREW TRAINING PO
HC-4

• As was pointed out in the lead article in the helicopter section of the September 1967 Crossfeed, Part 2, there is a definite need for helicopter contingency rescue plans. Your squadron's emergency communications procedures during rescue operations in case of loss of ICS in the UH-2B and CH-19E are certainly a big step in the right direction.

The helicopter analysts here at the Safety Center endorse your idea. The only questions raised are: 1) Is any modification of hand signals necessary at night? 2) It seems inadvisable to use thumbs-up and thumbs-down to indicate raise and lower hoist when these signals have other universal meanings; can two other signals be easily substituted?

Plans such as your squadron's should be submitted as NATOPS modification proposals (as you have done) and discussed at rescue symposia so that official action can be taken. Thanks for letting us hear from you and keep up the good work!

P-2 Passengers

FPO New York—Your answer to the letter concerning the wearing of survival equipment by passengers in P-2 aircraft in the October, 1967 issue appears to be somewhat incomplete. Granted, *OpNav Instruction 3710.7D* does state that the requirements for the miscellaneous safety and survival equipment are waived for passengers when flights are made for transport purposes in noncombat zones. However, *OpNav* also states that "minimum safety and survival equipment requirements for passengers and flight crewmembers shall be enumerated in the *NATOPS/ NATOPS Flight Manual* for the aircraft concerned."

The *NATOPS Flight Manual* for SP-2H aircraft *(NavAir-01-75-EEB-1)* is specific as to what items of personal flying equipment shall be worn by

HC-4 Emergency Procedures Used for Loss of ICS in UH-2B/CH-19E Aircraft

1. Draw pilot's attention
   a. UH-2B. First, tap pilot lightly on left shoulder, then point to microphone and give a thumbs-down (I have lost ICS).
   b. CH-19E. Place hand between pilot's ankles and alternately tap gently with the hand. (I have lost ICS.)
2. Where to signal pilot
   a. UH-2B. Hand must be on the right side and just forward of the pilot's head.
   b. CH-19E. Place hand high and between pilot's ankles.
3. Procedures for directing/use of hoist
   a. Move forward—palm facing forward
   b. Move aft—palm facing aft
   c. Move right—palm facing right
   d. Move left—palm facing left
   e. Move up—palm facing up
   f. Move down—palm facing down
   g. Steady—closed fist
   h. Lower hoist—thumbs-down*
   i. Raise hoist—thumbs-up*
   j. Clear to go—close door (UH-2B only)
   k. Clear to go—two thumbs-up (CH-19E only)

NOTE: Hand may be returned to assist in hoisting after each signal.

*See NavAvnSafeCen helo analysts' comments, column 2, above.

personnel in P-2 aircraft. Certain items are specifically listed as optional for personnel designated as passengers on the yellow sheet or DD-175 but protective helmets, flight suits, gloves and the SP-2H flying boots are not, repeat, not included in this list of optional equipment.

LCDR T. GIBBONS
STANDARDIZATION OFFICER, VP-56

• You are correct. NATOPS changes covering this subject had not been received locally when Headmouse's answer was written.

Litter Bit

Shearwater, Nova Scotia— A Canadian S-2 *Tracker* recently picked up this foreign object (see photo) on takeoff. Full power, 56" MAP, was available when takeoff commenced but this was followed by a loud bang from the affected engine and an immediate drop in MAP to 45".

Export cigarette shipping tag clogs R1820's throat.

Since you use the same model aircraft and engines I thought this information may be of value to the USN.

LT M. BABCOCKE RCN
ASO, VS-880

• Thank you for "exporting" the photo. The same type of foreign objects have wound up in similar places on some of our aircraft and caused the same effect. We are quite willing to share in the "foreign object" lesson.

Floatable Litter

Westwood, Mass.—An inquiry in the October 1967 APPROACH by PR2 R. T. Perkins concerning a floatable litter and your answer suggest additional comment. I have seen a completely new version of this type litter. It is completely inflatable with no metal parts and its rigidity upon inflation is remarkable. It is under development by Rubber Fabricators, Inc., Grantsville, W. Va.

I have also seen a prototype of a modification for the presently available Stokes litter. This likewise is under development. The model is currently a plastic foam but it adds to bulk for storage. The revised design utilizes an inflatable technique to convert the Stokes into a floating cradle. Bulk in storage is avoided because the adaptation is deflated until required. Further information on this adaptation may be obtained from Hydrospace Corp., 901 Smithfield Ave., Lincoln, R. I.

ROBERT J. PERCHARD

• Thank you for your letter. The January issue carried two other letters on floatable equipment for rescuing and transporting injured persons. One was from CDR P. A. Hogue, USCG, on the Coast Guard's helicopter rescue basket, and the other (with photos) from LCDR E. L. Murnane, USCG, on a modified Stokes litter.

Safety Poster Attaboy

FPO New York—The four safety posters enclosed are submitted for possible use in the promotion of aviation safety.

CDR SAMUEL E. LATIMER, JR.
CO, VA-106

• Our thanks to CDR Latimer and to the officers and men of VA-106 who had a hand in preparing the material. The posters are now being worked up by our art department for publication.

This is not the first time that VA-106 has submitted ideas for safety promotion materials. Some of their contributions over the last few years are shown right. Recognize many of them? All appeared as posters and several also graced back covers of APPROACH.

A thoughtful and serious effort, with a sound idea behind it, goes a long way towards helping us produce posters and other materials for promoting aviation safety. If you have an idea, submit it today. We're always in search of new material and better ways to present it.

Well done, VA-106.

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request.

Address: APPROACH Editor, U. S. Naval Aviation Safety Center, NAS Norfolk, Va. 23511. Views expressed are those of the writers and do not imply endorsement by the U. S. Naval Aviation Safety Center.

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Our product is safety, our process is education and our profit is measured in the preservation of lives and equipment and increased mission readiness.

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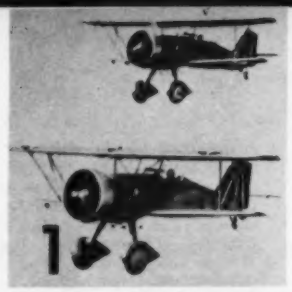

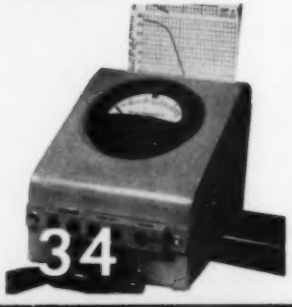

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CREDITS

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Next Month

Wind, Waves and CVs

and other items of interest to the Naval Aviator.


Testimonial
In retrospect exactly two hours after I pulled the curtain, I can say with complete confidence that I owe my life to the designer of the ejection seat and the technicians, riggers and line crewmen who maintain and inspect it. If the seat had not worked exactly as advertised in the fully automatic single-point mode, I would not be here to write this statement. To those who indeed, insured that the ejection seats in this aircraft were 100 percent reliable and to the countless others in whom all aviators place complete confidence for survival in situations such as mine, I offer my humble and heartfelt thanks.
—T-1A pilot after ejection

It's that
time again,
so...

DON'T FLY WITH A COLD!